MINING CONGRESS JOURNAL

V 25 | 11

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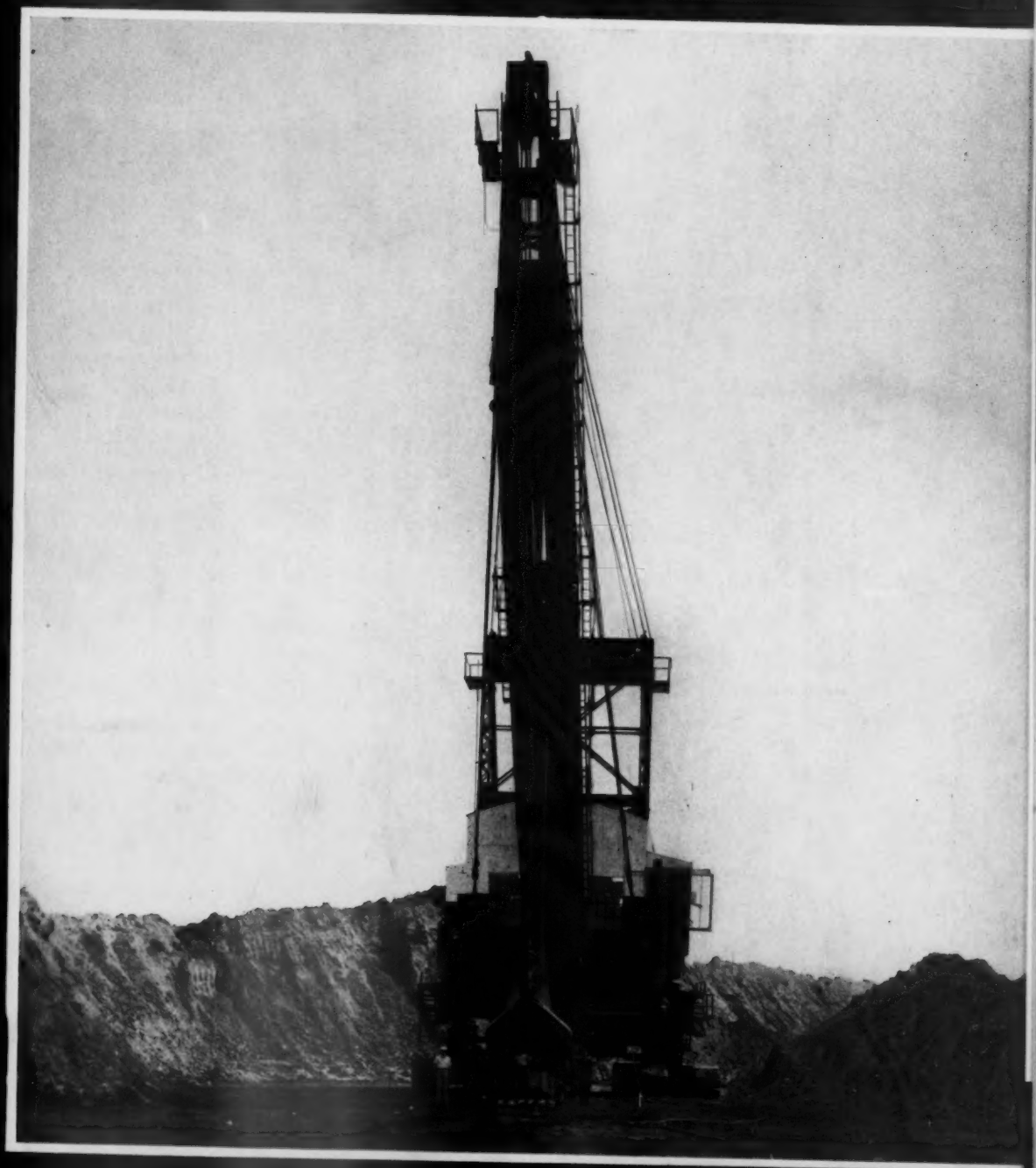

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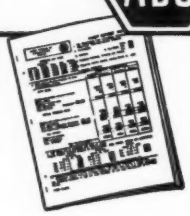

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MINING CONGRESS JOURNAL

An A. B. C. Publication

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How to Get the Most Out of Your Rock Drills

"The Drill Doctor is my Best Friend"....

Just the other day, I ran into some piston breakage. It didn't take me long to get to the bottom of the trouble. I found some worn chuck bushings that let the drill steel run so far out of line that the piston just hit the edge of the shank. The pistons couldn't help breaking.

Then I began figuring how to get around it. I said to myself, "I take care of my car, have it tightened up and checked over regularly. Now here's a rock drill that takes a lot bigger beating than my car, so why shouldn't it be looked over too?"

So now I have each drill brought up on a regular day every month for checking. I don't have to worry about worn chuck bushings anymore or about badly worn parts letting go.

This system cuts down the delays in my workings and that saves money. I don't mind telling you that the drill doctor is my best friend.

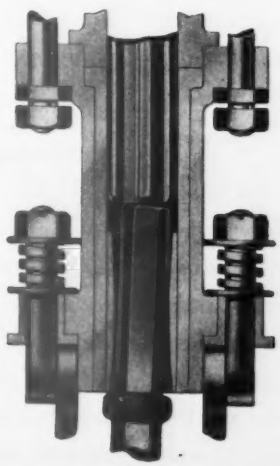
• • •

Worn Out Parts Cause Delays and Increase Drilling Costs

1. Have your drills inspected at regular intervals.
2. Replace worn out parts before they cause trouble.
3. Check fronthead bushings and keep them in good condition.

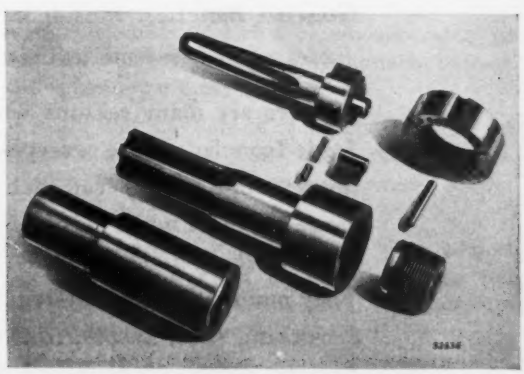
Please Note

This is one of a series of talks intended to create a greater awareness of operating conditions, so that the users of rock drills can more nearly get out of their machines what the Ingersoll-Rand Company's designers, engineers, and metallurgists have built into them. *Reprints of this talk or of any of the series may be obtained for your bulletin boards, for use as payroll stuffers, etc.*



Replace worn chuck bushings. They permit the drill steel to go out of line so that the rock drill piston does not hit a full square surface.

Keep your drill parts clean and in good condition by making frequent inspections. You will obtain higher drilling efficiency, because your delays will be fewer and your drilling speed faster.



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Take Care of Your Rock Drills and You'll Increase Your Profits

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Kansas City, Knoxville, Los Angeles, Newark, New York, Philadelphia, Picher, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

Ingersoll-Rand

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Installing Exide-Ironclads is like flattening out the grades in a mine

YOU put new brawn and energy into locomotives when you install Exide-Ironclad Batteries. It is like leveling the grades when these batteries exert their power.

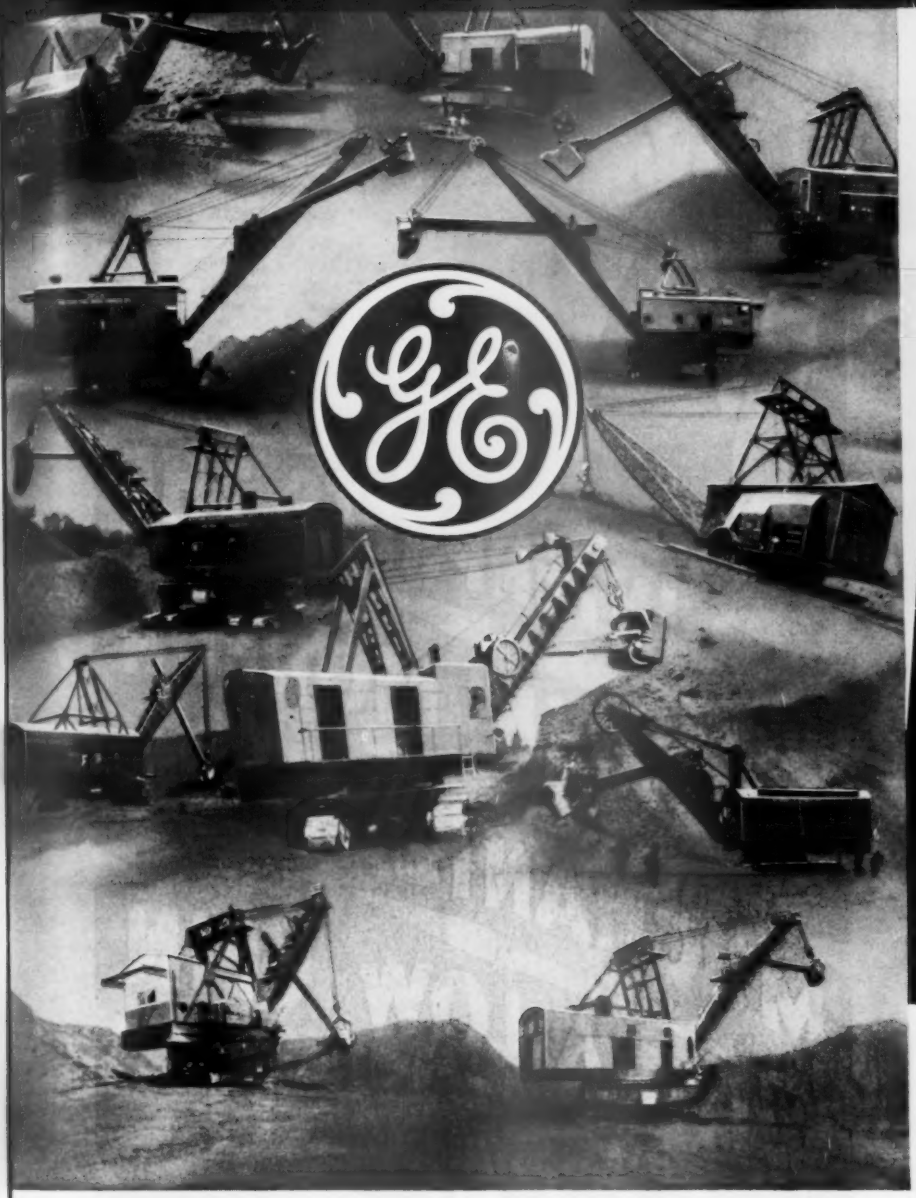
There are many reasons why this is so. Exide-Ironclads have exceptionally high power ability—they can deliver a great surge of power when needed, which makes light work of unusual loads and grades. They maintain a good voltage all through a working shift, keeping the speed of the haulage service consistently good, hour after hour. They keep out of trouble and cut delays to a minimum.

In addition, you pay no premium for this superior service. Exide-Ironclads last so long and cost so little to maintain that they keep haulage costs low. These facts go far to explain why Exide-Ironclads are the most widely used batteries in storage battery locomotive service today. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

The World's Largest Manufacturers of Storage Batteries for Every Purpose

Exide Batteries of Canada, Limited, Toronto



Electric SHOVELS Everywhere . . .

G-E Equipped for Dependable Operation

OPERATORS throughout the open-pit mining fields know they can depend upon G-E equipped shovels, despite the tough conditions of service that must be met.

Excessive dirt and moisture, high momentary overloads, an extremely rapid and variable duty cycle, and, frequently, the lack of facilities for proper maintenance are just a few of the reasons why the lot of electric-shovel motors and control is not a happy one.

But G-E equipment for shovels is designed for just such conditions. It includes, for example, the famous Type MD motors (also used extensively in steel mills), special three-field generators, and special controllers and contactors.

Basic Contributions

In addition to developing this equipment during 25 years of close co-operation with the shovel builders, G-E engineers have made such basic contributions to better shovel operation as the application of d-c apparatus, of the generator-field control principle with variable voltage features, and separately excited motors.

In recent years they have made many contributions to refinement and simplification that make possible even smoother, more flexible, and more economical shovel operation.

Why not get the entire story from the G-E shovel specialist in your territory? He can also give you full information about the engineering and renewal-parts service that becomes available to you when you buy a G-E equipped shovel. Then, when you are ready to order a new shovel or to remodel an old one—make it a point to SPECIFY GENERAL ELECTRIC EQUIPMENT.

GENERAL ELECTRIC

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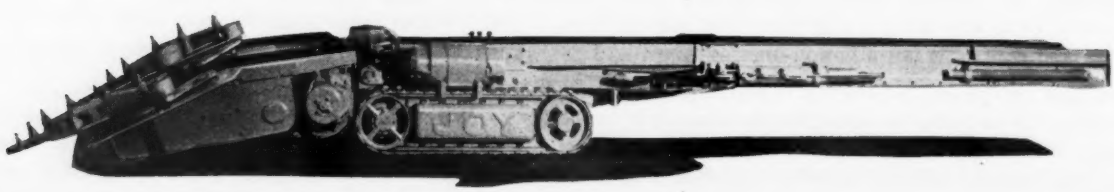
INTERPRETS THE TREND IN MODERN MECHANIZATION WITH A LOW VEIN HIGH CAPACITY LOADER

ASK A JOY ENGINEER FOR COMPLETE DATA ON THE **14-BU LOADER.**
5 TONS A MINUTE—
ONLY 26 INCHES HIGH



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MINING CONGRESS JOURNAL

Vol. 25 NOVEMBER, 1939 No. 11

About a month ago Walter Winchell included in his radio flashes a statement that before long the "National Committee for People's Rights" would release a scandalous exposure of living and working conditions in the Tri-State zinc mining district.

This matter was immediately investigated by Evan Just, secretary of the Tri-State Zinc & Lead Ore Producers Association, who finds that the Committee comprises a group of liberals who have endorsed distorted stories of conditions in the area, unwittingly lending their assistance to a "smear" campaign intended to dramatize certain conditions as was done in West Virginia a few years ago. Truth concerning dust conditions in mining and of th eeffective work done to eliminate this hazard since 1915 apparently was not known to the parties instigating the expose. Read Mr. Just's account of this on page 44.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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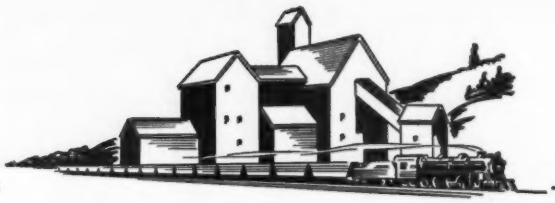

World Peace Through World Trade

This is the basic thought of the International Chamber of Commerce.

Its president, Mr. Thomas J. Watson, whose activities in many fields are deserving of the highest commendation, seems to have lost sight of the fact that high standards of living in this country require the protection of trade barriers. Mr. Watson insists that he does not mean free trade but "an adjustment—fair to all countries—and a better distribution of raw materials, food and clothing throughout the world."

As a matter of fact, such adjustments are made whenever the law-making body, which represents the people of this country, believe such adjustment should be made. This is the American way.

When Congress could not be trusted by the Executive, we undertook to make tariffs by bargaining with the several countries, and by this process to destroy by sections the restrictions upon importations which Congress had already approved. This is not the American way.

Ours is a representative Government, and its representatives are supposed to perform the duties for which they were elected.

From a legal standpoint no agent, clothed with discretionary powers, has a right to delegate such authority.

Our representatives have (illegally as the writer believes) delegated the power to legislate in matters of foreign trade which are vital to our industrial prosperity. And this responsibility, most vital to the nation, is now subject to the conclusions of one man—a man who has not been delegated by the votes of the nation to determine the questions involved.

Under these conditions we are being urged, by an organization representing the nations of the world, to adjust our trade barriers by a reduction of tariffs to permit "a better distribution of raw materials, food and clothing throughout the world."

Mr. Watson seems to overlook the fact that there are no barriers to the export of these products from the United States. All countries of the world have an open, unrestricted chance—"a fair opportunity to share in the resources" of this country.

The basic fact that our Constitution prohibits export restrictions is a complete answer by the United States to the resolution of the International Chamber of Commerce asking for an adjustment of trade barriers.

During times of world peace every nation in the world, large or small, may purchase at the going price any product of any other nation for which it has the money to pay.

Desire for empire is the chief obstacle to world peace. Italy desired to control Ethiopia; Japan to control China; Germany to control all of Central Europe, and having reached this goal, extended the hand of peace.

Our own peace can best be secured by minding our own business, staying at home, ridding ourselves of all foreign entanglements, treating all countries alike and by a renunciation of every movement toward imperialism.

World trade is desirable but is not a solution of international peace problems.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 25 NOVEMBER, 1939 No. 11

Richard J. Lund, Editor

A STEP IN THE RIGHT DIRECTION

RELEASE on October 18 by the Wage and Hour Division of the Labor Department of a revision of their original ruling relating to meetings and lectures sponsored by the employer is a decidedly salutary move. In effect, the new ruling will permit a wide variety of safety and first aid training without requiring time spent by the employes at such meetings to be classified as "time worked."

The first interpretation, issued May 3, threatened serious curtailment if not actual stoppage of the effective safety and first aid work throughout the country in mining and other industries, including that of Federal and State agencies as well as that sponsored and conducted under the initiative of private enterprise, by requiring payment for time spent by employes at such safety meetings. A storm of vigorous protests immediately arose over this threat to the safety movement, and many conferences have been held between interested parties and officials of the Wage-Hour Division, in which representatives of the American Mining Congress and Dan Harrington, chief safety engineer of the Bureau of Mines, participated actively.

A statement by Administrator Andrews following the first of these conferences was not sufficiently broad to cover the situation, and numerous other statements by the General Counsel of the Division amplifying the ruling have now been consolidated into the new interpretation.

Of great significance to mining is paragraph (e), reading as follows:

"Safety meetings which take place outside working hours and are conducted, sponsored or otherwise approved by a governmental agency (state or federal) or by any recognized independent or other bona fide organization engaged primarily in disseminating safety information, will not be considered 'directly related to the employe's work.' Furthermore, even if the safety meeting is not so conducted, sponsored or approved, it will not be considered 'directly related to the employe's work' if it is conducted outside working hours as part of a general safety program which is not restricted to the hazards of the job at hand or to the personal responsibilities of employes in doing their job safely and efficiently. Accordingly, voluntary attendance at such meetings need not be considered hours worked."

Other paragraphs define what is considered "voluntary" and "directly related to the employe's work," specifically including time spent in attending "meetings and lectures for the purpose of teaching the employe mine rescue, fire prevention and control, and the use of new types of machinery or methods on his job" as time worked.

Although this ruling is a step in the right direction, there are still clauses which might be so interpreted to endanger further progress in safety and first aid training.

Reports indicate that within the past several months interest in the mine safety movement as evidenced by meetings and participation in first aid training has decreased by about one-third—a serious indictment against this ruling and those responsible for its formulation.

What is urgently needed is passage of a clearly written statutory exemption for safety meetings and first aid training in the regular session of Congress opening in January. Only in this manner will companies feel free to resume active progress in this humane movement.

DATA ON ENERGY RESOURCES

CONTAINING a wealth of information on various aspects of coal, oil, natural gas and water power, the voluminous report on "Energy Resources and National Policy," recently issued by the National Resources Committee, is worthy of careful study by the mineral fuels industries.

The summary of the report, embracing a preview of the future of energy resource industries as viewed by Washington planners, was released in February in mimeograph form, and was the subject of an editorial in the March JOURNAL. Although we cannot agree with all the plans and objectives therein outlined, the elaborate staff studies amplifying the summary statement are replete with information on fuel resources and use, compiled by experts from a multitude of sources. It is a valuable compendium of literature that will find extensive reference use.

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Machine Maintenance—Practices, Procedure and Records*

By ERNEST PRUDENT

Electrical Engineer
Bell & Zoller Coal & Mining Company

ERNEST PRUDENT

MAINTENANCE of mining equipment due to mechanization is rapidly becoming a specialized phase of the mining industry. With the many new pieces of equipment made possible by the ingenuity of engineering and design, the maintenance departments have many new and varied problems which make this work very interesting.

Maintenance practices are governed to a large extent by the type and size of the mining operation. Large operations are at a disadvantage to the smaller operations inasmuch as more equipment and service men are involved. However, operations on a large scale do have the advantage of being able to set up departments within the maintenance department with maintenance men specially trained in one or more specialized vocations. Many times at the smaller operating mines an armature winder or other handy man is found to be a jack-of-all-trades.

This discussion will deal with the practices employed at a shaft operation with an average 7-hour capacity of 7,500 net tons of washed coal. This mine is fully mechanized with 20 mobile type loaders, 20 mining machines, 50 mine locomotives, 9 generator sets, coal drills, and auxiliary equipment. Electric power is generated at the mine.

Practices and Divisions of Various Maintenance Work

A fully equipped surface shop is the logical place to send equipment parts or units requiring the use of many or part of this shop's machine tool equipment when rebuilding units or reclaiming parts. In order that the responsibility of the maintenance of the production equipment is not divided, the chief electrician in charge of this electrical and mechanical maintenance work is allotted a section of this surface shop. He has employed in his shop three specially trained men.

One of these is a mechanic, whose chief duties are the rebuilding and reclaiming of loading machine parts such as clutch units, hydraulic pumps, pressure hose, and control valves. Every rebuilt machine part or unit is put in the original standard condition to the exact measurements as originally designed. All hydraulic equipment is tested at 50 percent over the usual operating pressure.

The second man is a welder, experienced and trained in the art of welding different metals. His work is largely that of the rebuilding of loading machine heads, conveyors, and locomotive frames. At times when rush jobs are encountered, a second welder is available on the night shift.

As this mine makes all the electrical power needed for its operations, the third man of this crew is an electrician who is thoroughly acquainted with the power house equipment, which consists chiefly of two 2,300-volt turbo generators, voltage regulators, switching equipment, and overhead power lines to the five bore holes. Other maintenance work to the shop equipment, water treating plant, river pumping station, surface telephones, and lighting requires about 50 percent of his time. The remaining time he carries on a systematic program of the rebuilding of loading machine trailing cables. These cables are sent to the surface on a specially constructed reel by the night repair men when the cables have become unsafe to use due to the many splices made at the face. The cables used are entirely rubber covered, and in the rebuilding, soldered sleeve splices are made. The splice is then insulated with rubber and vulcanized, making the cable comparable with a new one. It has been found to be profitable to re-cover a piece of cable as short as 10 ft.

Use of soldered sleeve splices followed by vulcanization of rubber covering makes old broken cables like new

On the shaft bottom is located a main shop equipped with a lathe, a drill press, a power saw, arc welder, acetylene-oxygen cutting and welding torch, an armature bake oven, dipping tank, and a supply room.

One member of the shop crew is an armature winder who is also a lathe man. He takes care of all of the armature rewinds for the 175 d.c. motors which are used underground. During the year 1938 only 16 rewinds were required for the 996,000 tons of production, and of course much of his time is spent on lathe work making

* Presented to 16th Annual Coal Convention of the American Mining Congress.

Rewiring motor for mine locomotive

small parts used on the mine locomotives and mining machines. The armature winder also assembles all bearings and housing on all armatures. Each and every spare armature is completely fitted up and made ready for the repair men to put in the various machines. All ball bearings are brought to a temperature of 212° F. in an electric oven before they are put on any shaft. This eliminates any damages which might be caused by driving the bearings on cold.

During any absence of the chief electrician from this main shop, one man of this bottom crew who is acquainted with all the underground equipment acts as a shop foreman, directing the general routine and any other work that may be reported by phone from various sections of the mine. His other duties comprise coal drill repairing and the welding of many small parts in the process of material reclaiming.

Locomotive Repairs and Inspection

The 50 mine locomotives used at this mine are from five different manufacturers of 11 types, 15 of which have the year of 1907 as the date of their manufacture. They have been modernized from time to time, and today do a fair job of competing with present day locomotives. Six men are continuously engaged in repairing, oiling, and inspecting these locomotives. They work in pairs, one acting as a leader, the other as helper. One pair works on the first shift, one pair on the second, and one pair on the third 7-hour shift.

The two men on the day shift repair and reclaim any parts changed by the night shift and have these spare parts ready for the following night. This work is attended to first if there are not any locomotives in the shop for repair. These men also assemble journal boxes and bearings on the spare truck axles and have everything ready for the night repairmen, so that the work of the night repairmen is very largely concerned with that of inspection and changing parts.

The first duty of the men on the second shift is to put the six-battery locomotives on charge. Then they start their regular work as is reported to them by the day shift.

Following the second shift, two men on the third shift finish whatever jobs are left over by the second shift, and as our practice calls for the complete inspection of every locomotive every five operating days, these two men are concerned to a large extent in the inspection work, as an average of 10 locomotives must be inspected every work day. This third shift also repairs any locomotives used by the night shift that requires their service.

Underground mine locomotive repair room

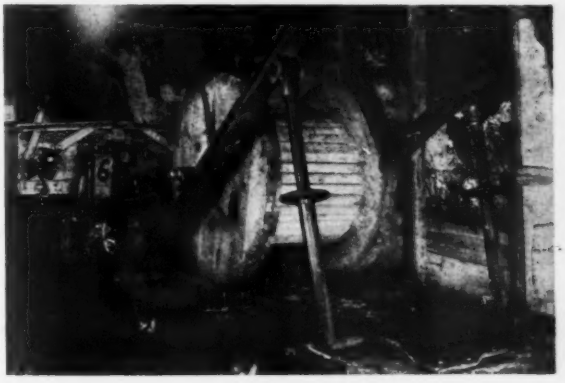
Mining Machine Repairs Centered in Bottom Shop

At the present only one type of mining machine is used in our mine. Two men are continually employed in repairing and rebuilding these machines. A spare machine is ready at all times. Seventy-five percent of all the maintenance work on these machines is done in the bottom shop. Only minor repairs are made at the working face. When machines are rebuilt, the thoroughness of the rebuilding process is extended as far as a coat of protective paint. This coat of protective paint has a very great psychological effect on the operators. When an operator receives a machine that is in truly good operating condition and is all painted up as if new, he takes more precautions with it. It is the same feeling that you register when you get a new, bright, shiny automobile. You are much more careful with the new automobile than you would be with the old one you just traded in. Mainly, this is the reason for the protective paint.

Just as our mining machines are repaired and rebuilt, so are the loading machines. We have one spare loading machine for use in case of an emergency. The face repairs are minor as on the mining machines. Two men are kept continually employed on the loading machine repairs in this bottom shop, but at times they are given help, depending on the size of the job and the amount of work to be done. Many times men on the day shift are switched from mine locomotive and mine machine repairs to loading machine repairs and vice versa. This, after a period of time, proves beneficial to all concerned, as it acquaints the men with all types of machines.

Each loading machine foreman orders the necessary trolley wire and bonds for his individual section. By a written order to the chief electrician, the foreman states on this request the amount needed and where it is needed. If any wire can be recovered, it is also noted. The foreman's requisition is placed three days before needed, thus allowing the chief electrician the necessary time to plan his wire work.

Four regular wire men and two regular bond men take care of this work, and at times when partings are moved or much recovery of wire and cable from worked out sections is encountered they are given the necessary help.



Special truck for hanging trolley wires and feeder cables

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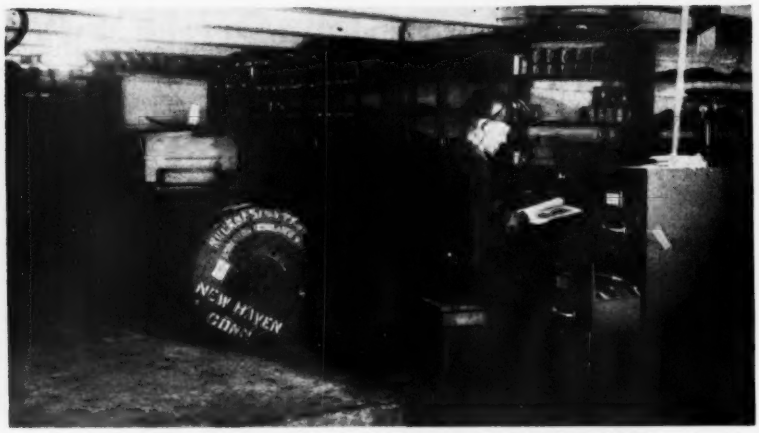


The quantity of materials and parts kept in underground repair stations is determined by frequency of failures of parts over period of years

In a mine of this size, of course, there is equipment other than that previously mentioned—generator sets, block signal systems, pumps, automatic circuit breakers, telephones, and so forth. One electrician looks after this, and in addition finds time to make voltage surveys with graphic instruments. Also, he assists the chief electrician.

Inside Repairmen—Day Shift

As each production section is 2½ miles from the shaft bottom, considerable delay would result if emergency repairs to any locomotive, loading machine, mining machine, or coal drill were required during the 7-hour operating period, necessitating a man being sent in from the bottom main shop. Therefore, one repairman is assigned to each of the five sections for these emergency repairs. In addition to these emergency repairs, these men also take care of all the lighting required on their sections and inspect the mining machines and coal drills. At the close of the work day these repairmen spend a few minutes of their time in making a written report regarding any equipment failures, stating the nature of the breakdown, the possible or known cause, and the minutes of time lost in making the repairs. This report of equipment failures is used as a check against the loading machine foreman's report. Any repair parts changed by these inside day men are tagged as to the unit on which they were used, are left at this section's inside repair station, and are brought out to the main shop by the night repairmen.

Inside Night Repairmen

Two men, one leader and a helper, are given one section to serve. Their work consists of repairing and lubricating the loading machines plus the minor repairs to mining machines and coal drills. Any major repair jobs to any loading machine, mining machine, or drill would be handled by them. They would take the spare loading machine, spare mining machine, or the spare drill in from the main shop and bring the bad order equipment out to the main shop, where the day men would make the necessary repairs and have the equipment ready for the following night. These inside night repairmen receive their work orders from an office in the lamphouse on the surface. These orders are made out by the chief electrician and his top mechanic on specially provided forms. The information recorded on these work forms are: the unit number, location of machines, nature of repair needed to be made, and any instructions which the supervisor thinks necessary. Some of this information is obtained from the loading machine foremen, who personally report to the chief electrician at the end of each work shift. At times other information is obtained from the reports of the inside day men who, during the day, have found things which need attention that night.

These night repairmen O.K. the reported repair jobs, report the amount of oil and greases used on each machine, and the amount of time required to service each machine. As one loading machine on each section is thoroughly inspected each shift, the conditions found are also reported on a weekly inspection form. Any materials or parts changed by the night repairmen are tagged by them, denoting the machine number, and are also brought out by them to the main shop.

To make this material or parts question clear: The quantity of materials and number of parts which are kept in the inside repair stations have been previously determined by the frequency of failures of the different parts over a period of years, this having been determined by the systematic check of all failures and time lost. It has been found that only minor parts are required near the face, such as swing ropes, hose, spare pumps, an assortment of bolts, nuts, split keys, and conveyor chain parts.

The replacement of these minor parts by this method works out automatically. For example—one section of four loading machines has eight swing ropes in use, and two ropes for spares are located at the section's station. If one is used today or tonight, it will be brought out by the night repairmen to the main shop, and the following night it will be found tagged for the night men to take in. This same method is carried out on all minor parts replacements which have a high frequency failure rating. Other larger parts and units which have a low frequency failure rate are located in the main shop on the bottom where they may be obtained day or night. Loading machine failures at this mine during the past year have been accurately checked and found to be slightly less than 2 percent of machine operating time as an average for all the machines.

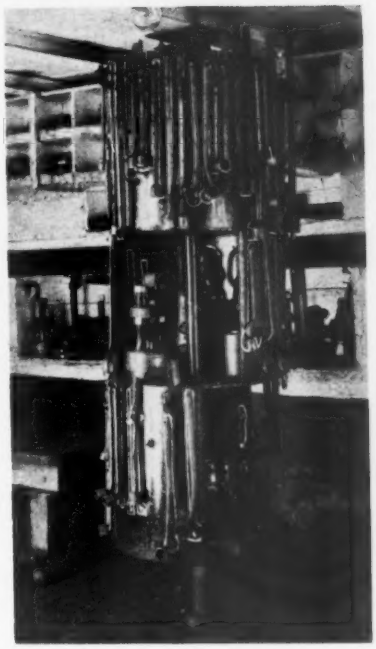
Procedure

Preparedness plays an important part in maintenance service.

In order that repairs be made properly and with the least possible delay, every repair job of any consequence should be carefully analyzed. This analysis will guide the maintenance men in being prepared. The essentials of preparedness for repair work at the working face are: knowledge of the exact nature of the repair work, location of the machine, proper materials to use, proper tools to work with, and competent service men who are familiar with the work.

Condition of Equipment.—Weekly inspections are valuable, not only as a guide with which repairs are to be made before machine failures occur, but as a helpful factor in the planning and scheduling of major repairs. This allows time for preparedness, eliminating rush jobs and overtime work.

Proper Tools.—On present day equipment, the monkey wrench, cold chisel, and hammer are not sufficient for technical repairs which should be made with a considerable amount of workmanship. To cite one example,



Each tool has its specified position on this revolving tool rack in the underground shop

many spanner nuts are demolished because the proper spanner wrench was not available, a cold chisel having been used instead in setting up the spanner nut. Specially made pullers for gears and pinions many times pay for themselves the first time they are used.

One way to be sure the proper tools and pullers are at hand on major face repair jobs is to require that these tools accompany the part to be used in the replacement. For example—a clutch unit is to be changed, which requires special tools and pullers. Have these things in a box with the clutch unit. The box should be fitted with a cover to keep out dirt and foreign material, and these special tools and gadgets should always follow this unit. One of the important duties of the surface mechanic who rebuilds these units on the surface is that of checking and seeing that these special things are included.

Competent Workmen.—Generally our repairmen work in pairs, one of them being the leader. The leader is the older man in the department's service and the more highly trained in the maintenance of special equipment. He is thoroughly familiar with the regular routine, and knows the materials and tools necessary for the different repair jobs, including all the short cuts. Men serving as helpers are promoted to leaders after they have, themselves, proven capable to fill a vacancy left by a leader. Only on rare occasions are new men employed as leaders regardless of their experience, ability, and knowledge. They must start as helpers, learn the mine, get into our regular way of doing things, and prove themselves capable. This, we think, improves the morale of both the leaders and helpers. However, in cases of absentees among the leaders from sickness or other causes, the helper steps right into the leader's place, and with a new helper carries on without much difficulty.

Records

Armature Rewinds.—The armature winder records in a book all rewinds made, showing the type of coils used. A check recently made over a period of four years shows for the 163 d.c. armatures in use in the 50 mine locomotives, including reel motors, the 20 loading machines, and the 20 mining machines, there were 87 complete rewinds, which is equal to 87 sets of d.c. armature coils paid for by our purchasing department. This gives these armature windings an average life of 7½ years.

We expect to be able to increase this average life to 10 years by the addition of commutating field coils to some of our older type motors and by the use of the more modern coil insulation.

Locomotive Wheels and Axles.—When trucks are changed on our mine locomotives a record is also made, showing who did the work, the time it was done, and the type of brasses or bearings used. This information is useful in determining axle and bearing life, and new tire life compared to welded tires.

Cables.—Records of new trailing cables used assists in estimating yearly cable requirements.

Mining Machines.—Any mining machine brought to the main shop for repair or rebuilding, in addition to being branded with a shop number and date of overhaul, is also given a place in the shop record book, such information as new parts used and extent of overhaul is recorded. At the end of any year the number of trips of any machine to this shop is a matter of record. I might add that the machines with the highest tonnage mined are invariably the machines with the least number of trips to the shop.

DAILY REPAIR REPORT

LOCO. NO. _____ DATE _____ 19__

MECH. NO.

PARTS TO REPAIR

NEW PARTS USED

WEAR YOUR GOGGLES

REPAIRED BY _____ CK. NO.

HOURS TO REPAIR

BELL & ZOLLER COAL AND MINING CO.

REPAIRMAN'S DAILY REPORT

JOY No. _____ Date _____

Parts Repaired

New Parts Used:

Cat. No's.

Hydraulic Oil, Gals. Used

Grease Used

Hours Worked

COAL DRILLS:

Parts Repaired

New Parts Used:

Hours Worked

CUTTING MACHINE:

Parts Repaired

New Parts Used:

WEAR YOUR GOGGLES

Hours Worked

Repair Mans Ck. No.

Total Hours Worked

REMARKS:

Mine Locomotives.—At quitting time each work day a locomotive repairman takes a personal report from each motorman regarding the condition of his locomotive. Any repairs needed are noted on a locomotive repair form. The night repairmen O.K. the report and record any new parts used, together with the time required to repair. The following morning these reports are examined by the supervisor, and are filed away in a cabinet with 50 compartments, one compartment being numbered and allotted to each locomotive. A permanent record is thus easily kept, and, of course, at the end of the year this box will contain many interesting facts.

Reports of Location and Needed Repairs to Loading Machines, Mining

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Machines, and Drills.—These reports were mentioned before, and the only other comments I will make are these: The repairman, by having the correct location of the machines, does not lose any time finding the machine. He knows just about what he needs to do to each machine and the materials or parts required. This is an important step in preparedness.

Inside Day Men's Reports.—These reports also have been mentioned before, but I would like to add this: When so many machines and so many men are involved, the supervisor relies on these reports so he may keep in close touch with all the things that can occur during the work day that may need especial attention that night by his repairmen. In a very few minutes the supervisor can quickly survey the day's operation.

Daily Tonnage and Delay Report.—At the close of each day a report is made by the chief electrician showing the tonnage loaded by each loading machine and any loading machine failures. The weighman leaves a report of the tonnage and the loading machine foreman leaves the delay report. And if anyone is doubtful of the value of this report which is left on file in the maintenance office where all the repairmen receive their orders, he can, on any work day, watch the night repairmen when they come into the office to receive their work orders. Invariably these men will look over this report before they look over their work orders. And I know they are pleased when they find the machines on their section with a clean slate, free from machine failures and with record tonnages loaded. My assurance of their interest alone is worth the five minutes I spend in making this report.

Lubrication Reports.—Posted in the office is also an oil and grease chart which shows the amounts used on each machine as reported by the repairmen. It also indicates when barrels were delivered and the machine shifts per barrel. This has proven its worth in the savings of oil and greases.

Inside Substation Attendant's Reports.—Located underground in each of the five sections is a substation manually operated. The station attendant grinds all the mining machine and coal drill bits used on this section. He reports each shift the number of bits he receives from each machine, the number he regrinds, the number he replaces, the number of bits he sends to the surface shop for retipping, and the number of retipped bits he receives from the surface shop.

Mine No.....

BELL & ZOLLER COAL AND MINING CO.

REPAIRMAN'S WEEKLY INSPECTION REPORT

Jay No. ..... Date ..... Location .....

MOTOR:

Brushes and Commutator .....
Holders, Springs and Leads .....
Armature Bearings, Grease .....

CONTROLLER

Fingers and Tension .....
Segments and Cylinder .....
Wiring .....

CIRCUIT BREAKER

Contacts .....
Tripping .....

HYDRAULIC SYSTEM

Control Valve .....
Four Way Valve .....
Pressure Pump ..... Lbs. Pressure .....
Hoses and Connections .....
.....
Fwd. and Reverse Leathers .....
Front Jack Leathers .....
Rear Jack Leathers .....
Swing Cycl. Leathers .....

CLUTCHES

Front Clutch ..... Slipping Amperes .....
Rear Clutch ..... Slipping Amperes .....

CONVEYORS

Rear Chain Tension .....
Front Chain Tension .....
Compound Chain ..... Grease .....
Flights Rear Conveyor .....
Flights Front Conveyor .....

GATHERING HEAD

Seal Packing Rings .....
Grease ..... Dirt .....
Gathering Arms ..... Bolts ..... Bits .....

TRANSMISSION CASES

Grease ..... Leaks .....

CATERPILLAR DRIVE

Chain Tension ..... Grease .....

SWING ROPES

Ropes and Clamps ..... Sheaves .....
Remarks .....
.....
Coal Drill Inspected .....
Cutting Machine Inspected .....
Repairman ..... Ck. No. .....
Helper ..... Ck. No. .....
Total Hours .....

All of these substations operate in parallel and are interconnected through various large-size feeds of the main haulage system and other tie feeders. Load exchanges are predetermined and controlled by automatic reclosing circuit breakers. The station attendant makes a report of every power failure as it occurs every operating hour, so the supervisor may know that the power system is functioning properly every day.

Analysis of Reports

These records and reports heretofore mentioned are interdepartmental records, handled through the maintenance department and valuable to them in the guidance, the planning, and the preparation of maintenance service.

Our company's accounting department is not so much concerned in how we accomplish our results as they are in the net results themselves. However, this accounting department furnishes the supervisor of the maintenance department a cost statement each month showing the maintenance cost of each loading machine and the lubrication cost. They also furnish the operating department a statement showing the total tonnage loaded, the daily average tonnage, the average weight of the mine cars, and the tons yielded per shell used in the preparation for each loading machine.

By watching these monthly statements from month to month, I have found five important factors which governs to a large extent the maintenance cost of the loading machines. These five factors are:

1. Proper preparation of the coal to be loaded, which means correct undercutting, correct drilling, and the cleaning of the dust from the undercuts.

2. Power. I consider good power to mean rate motor voltage at the motor brushes or motor leads all the time.

(*Continued on page* 48)

New Equipment and Improved Practice in Metal Mining*

By LUCIEN EATON
Consulting Mining Engineer
Milton, Mass.

ADVANCES in mining practice and equipment have been retarded by all those forces that have deterred the investment of capital—excessive and punitive taxation, Government interference with private enterprise, a bad labor situation and a questionable fiscal policy. At the same time keen competition and the instinct of self-preservation have stimulated the creative impulses of both operators and manufacturers. Except in gold mining relatively few properties have been opened and equipped, and new construction has been mostly in the line of improvements at existing plants. As a consequence, new ideas have been put in practice slowly.

OPEN PIT MINING

The past few years have seen radical changes in open pit mining. Nearly all large shovels are now electrically driven, and the smaller shovels are driven by gasoline or Diesel engines. All shovels, even the largest, are mounted on caterpillar treads. Except in large stripping operations and in some quarries the enormous revolving shovels have been very largely superseded by faster revolving shovels with dippers of 3 to 5 cu. yds. capacity, smaller shovels being used for cleaning up. For loading into trucks, shovels with dippers of 1½ to 2 cu. yds. capacity are most common.

Scrapers and scraper-hoists have also taken a place in open pit mining. The hoists are powered by motors as large as 125 hp. and the scrapers have capacities up to 3 cu yds. Although used extensively underground and in gravel pits for years, it is only recently that scrapers have been put in use for handling ore on a large scale in open pits. In the larger sizes they are very effective in removing banks of ore that would be difficult to reach with other kinds of equipment. They are primarily clean-up equipment in the difficult parts of the pit.

Transportation Progress Spectacular

Perhaps the most spectacular change in open pit mining is in transportation. Trucks or tractors and trailer-wagons have replaced locomotives and cars in most of the new installations, except where the haul is long. It has not been determined definitely as yet which is superior, the truck or the trailer-wagon. Wagons with caterpillar treads have the advantage in mud and wet, for short hauls, but with reasonably good footing trucks seem to be more popular. The trucks are, of course, self-dumping, and some are of very large capacity, holding 20 to 30 tons.

The elimination of railroad tracks from open pits has made possible the use of much sharper curves and steeper grades. Curves of 50 ft. radius and grades of 8 percent to 10 percent against the load are common practice, and return grades for empty trucks may be as steep as 20 percent.

There have been a number of installations of conveyor belts for trans-

Trucks or tractors and trailer-wagons have replaced locomotives and cars in most new open pit installations, except where the haul is long

* Presented to Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, Aug. 29, 1939.

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Ruth Pit, Nevada Consolidated Copper Co., near Ely, Nev. Material excavated to date, 200 million tons

porting ore from open pits. The ore is delivered to the belts by feeders from pockets or hoppers into which it has been dumped by trucks or scrapers. The conveyor is most helpful in the final clean-up of a pit, and, although it is limited to ore that is reasonably fine and dry, it has taken a definite place in open pit mining.

A new departure in stripping mines is the use of the carry-all scrapers, hauled by tractors, for moving sand and gravel. These machines are widely used in highway grading, and move

10-yard truck—Canisteo Mine, Coleraine, Minn.

enormous quantities of suitable material quickly and cheaply.

No open pit is now fully equipped, unless it has a caterpillar tractor and bulldozer. This versatile machine is used for building roads, grading for tracks, spreading fill or waste on dumps, and cleaning the surface of the ore behind the stripping shovel. In the pit it cleans up spilled dirt, shoving it back to the face, where the shovel can reach it, and cleans the floor behind the shovel, so that the shovel can be used entirely for loading. It is even used for mining ore, pushing it to hoppers or chutes.

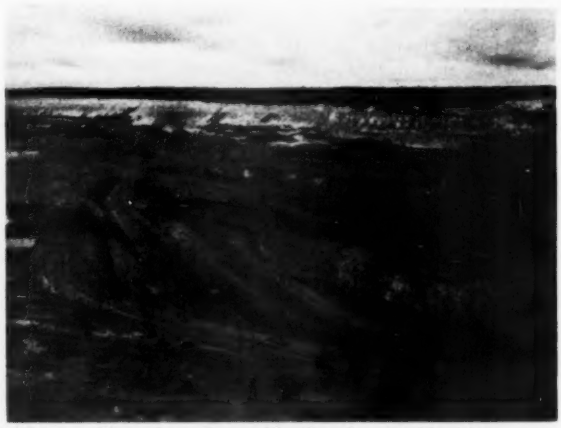
Drilling and Blasting

In churn-drilling for blasting the trend is definitely to larger holes, 9-in. in diameter instead of 5 in. or 6 in. The modern drills are all mounted on caterpillar treads, and use wire cables. They are mostly driven by electricity. With a bulldozer to prepare the road there is little time wasted in moving and setting up.

The larger holes permit wider spacing, and increase the effectiveness of the powder. The relative spacing of holes has been changed also. It has been the custom to have the distance between holes in the row less than the distance from the holes to the toe of the bank, as you might have holes 15 ft. apart and 20 ft. from the bank. Better fragmentation has been secured, however, by placing the holes farther apart and nearer the face. A few years ago "field blasting"—that is, shooting several rows of holes at the same time—was in high favor; but there seems to have been a reversal of trend back to single-row and double-row blasting.

To meet the demand for an ammonia powder that will not be affected by moisture, and to secure greater safety in loading, du Pont has brought out a new explosive under the name of "Nitramon." It is packed in cans of the right size to fit the bore-hole, and remains sealed in the can, when charged. It contains no nitroglycerin, and cannot be detonated by a low or by an ordinary cap or electric detonator or by Cordeau, but requires a special primer of dynamite or TNT. Such primers are supplied in cans ready for use.

An improvement on Cordeau Bickford Fuse has also been put on the market by the Ensign Bickford Co., makers of Cordeau, under the trade name of "Primacord." Cordeau Bickford Fuse, commonly called merely Cordeau, is TNT in a lead sheath, and, for suspension in bore-holes, is given a covering, or "counter," of tape or wire or both. Primacord consists of PETN (pentaerythritetetranitrate) in



Hill-Annex Mine, Jones & Laughlin Ore Co., Marble, Minn.—completely electrified. Production 1½ million tons per year

Bulldozing wash ore on top of bench 250 ft. long, leaving waste ore and rock to be loaded by shovel for the dump. Hill-Annex Mine

a waterproofed textile covering, and weighs approximately one-fifth as much as Cordeau, and is 20 percent faster. It is flexible, and can be tied in knots without breaking the core, so that there is no difficulty in connecting shots properly.

UNDERGROUND MINING

Changes in underground mining have not been as marked as in open pits. The trend is generally toward more selective mining, and may be noted in increased values per ton reported by some of the larger mining companies. The change has been made by more careful placing of holes, whereby lean material is left in place, rather than by discarding lean material after it has been broken, although both practices are followed. With the same object in view changes in shrinkage stoping to cut-and-fill continue to be made, in order to reduce dilution from the vein walls.

Shaft of Consolidated Coppermines, Kimberley, Nev. Production 8,000 tons per day

Interesting changes in stoping practice are reported from Noranda in Quebec by Fred S. Dunn in the *Engineering and Mining Journal*. Drilling deep holes with sectionalized drill-steel was started originally in order to increase the sublevel interval in sublevel stoping, but has since been applied to "long slope" mining, or "inclined raise stoping," as the new system is called, which is really an inclined version of sublevel stoping. Sublevel stoping is an open-stope method of mining reasonably hard ore without timber. The ore is broken by holes drilled up and down from sublevels, and falls into chutes at the bottom of the stope. The sublevel drifts are driven, usually on the center-line of the stope, at vertical intervals of 25 to 40 ft. Normally, if the sublevel interval is more than 25 ft., the ore must be broken underhand in two or three benches below the sublevel, because it is impossible to use drill-steel longer than the height of the opening. If sectionalized steel is used, this limitation is removed.

The "long slope" system of mining follows much the same principle as sublevel stoping, but the sublevels are inclined about 35 degrees from the horizontal, so that the broken ore will be removed by gravity. The sloping drifts, or inclined raises, are first widened to the width of the room, and then the floor pillars between them are removed by holes drilled up from below and down from above.

Successful drilling of 20-ft. holes from 7-ft. openings by the use of sectionalized steel was followed by "ring drilling," i. e., drilling holes radially from drifts or inclines, resulting in greater safety, better drilling and more efficient blasting. This has been followed in turn by "ring drilling" with diamond drills, using non-coring bits set with borts. The holes are 65 ft. deep. This technique has permitted an increase in the sublevel interval to 65 ft., but two sublevel drifts, one on each side of the stope, are used, instead of one on the centerline. Large instantaneous blasts are the rule with this method of mining, 3,000 to 10,000 tons being normal and 93,000 tons being the maximum reported.

Shaft Sinking with Shot Drills

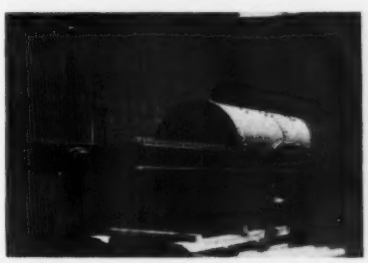
In shaft-sinking the most spectacular achievements have been the sinking of giant bore-holes by the Newsom method, using a special type of shot-drill, in which the driving motor is close to the cutting bit. The operator goes down in the hole to run the machine. The first shaft sunk by this method was at the Idaho-Maryland Mine at Grass Valley, Calif., where a 5-ft. bore was drilled, and the second at the Zenith Mine, at Ely, Minn., where the bore was 6 in. larger in diameter. Improvements in technique have decreased the cost and increased the speed of sinking by this method, which has made a field for itself in sinking ventilation bores in solid ground. The Zenith bore was sunk 1,208 ft. in eight months at a direct cost of less than $20 a foot.

Advances have also been made in sinking hoisting shafts. In northern Michigan in sinking a vertical shaft hoisting was done with skips directly from the shaft-bottom, following South African practice. The skips had extension guides 50 ft. long, and were filled by means of auxiliary loading boxes and pans, which were raised above the skips by small air-hoists. The use of these loading boxes is standard practice on the Michigan iron ranges, but they have heretofore been used mostly for filling cars on sinking cages. Another development in shaft-sinking was the use of the "burn out" cut, by means of which rounds of 10 to 12 ft. were broken.

Tandem Drums for Hoists

When the new hoists for the Ross shaft at the Homestake Mine were built, they were each given two conical drums placed in tandem instead of one double conical drum or two conical drums on a single shaft. The drums are connected by interlocking gears. Tandem drums have been used before, but the design of the drums and the interlocking gears are new. Since this installation was made others similar to it have been made in Canada. The design decreases the fleet angle of the hoisting rope, and permits the hoist to be placed closer to the shaft.

Both skips and cages have been built of aluminum alloys for several years, reducing the weight about 30 percent. Nickel alloy steel has been used for the same purpose, and has accomplished the same reduction in weight. Because it resists abrasion better and is more easily welded, alloy



Nickel alloy steel skip of Levack Mine, International Nickel Co., near Sudbury, Ontario

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steel has gained in popularity for skip construction, but aluminum is more generally used for cages.

Welding has replaced rivets very largely in building skips, and changes in design have followed. To prevent sticky ore from accumulating in the skip the corners are beveled or rounded, and the bottom is made hemispherical. Dump-rollers are made larger than formerly, and are equipped with tapered roller-bearings. The newest wrinkle is to put the dumping-horns on the dump-plates instead of on the skip, and to have two sets of rollers on the skip.

Preformed Rope Use Increasing

The use of preformed wire ropes, especially in Lang lay is increasing. In this type of construction corrosion is most apt to affect the filler-wires, and has prejudiced some operators against Lang lay. An experiment, the result of which has not yet been ascertained, is the galvanizing of the filler-wires in a large rope to prevent corrosion.

In power-transmission underground it is to be noted that American manufacturers are now following European practice in the use of paper insulation for high voltages. Cambric insulation disappeared in Europe over 10 years ago, its place being taken by paper. Improvements in rubber insulation have increased its life, and have removed the main criticism that has been applied to it.

A new cable support for suspension of cables in bore-holes has been put on the market by the Anaconda Wire and Cable Co., but this method of taking cables into mines is more common in coal mines than in metal mines.

Improvements in Powder and Caps

Technical improvements have been made in the powder for underground use, most of the new powders having a higher stick-count per box. The Ensign Bickford Co. has brought out a new master fuse-lighter, which simplifies and makes safer the lighting of fuses in breasts. It is a combination of the idea of the old ignition-box, in which the ends of the fuses were lit by slow-burning black powder, and the fuse-holding stick, invented by a miner in Iron River, Mich., which was whittled out of a piece of powder box, but the new master fuse-lighter is an improvement on both.

Hard cardboard tubes, which hold the primer and protect the blasting cap or detonator from outside friction or impact in charging, have also come into use. In one type the primer stick or powder is firmly glued in the tube. They are also making a practice of tying the detonator to the side of the stick rather than inserting it inside.

The Atlas Powder Co. has also brought out a new line of caps under the trade name of "Manasite," which are less sensitive to shock than those in which fulminate of mercury is used.

Increased Use of Deep-Well Centrifugal Pumps

In pumping an increase is to be noted in the use of deep-well centrifugal pumps for draining overburden before stripping or shaft-sinking and also for unwatering mines. In shaft-sinking an air-driven centrifugal sump-pump, throwing to an electric centrifugal pump, set on the shaft timber 20 to 40 ft. above, has taken the place of suction-hose and sinking-pump. It is less noisy, takes less room, and is more convenient.

Electric motor-pumps, placed on successive levels, either singly or connected in series and equipped with automatic controls, have in many places taken the place of higher-lift pumps at greater intervals. The speed of centrifugal pumps has also been increased, and they are now run at speeds as great as 3,500 r.p.m. even in fairly large capacities. For very high lifts, however, plunger pumps are considered superior, and one of the latest installations is a duplex horizontal plunger pump throwing directly to surface 2,600 ft. vertically.

Loading Machines

The Gardner-Denver Co. and the Sullivan Machinery Co. have put on the market loaders similar in general design to the Eimco Finlay loader. The Eimco Corporation has also put out a larger machine for use in large drifts. The Conway loader retains its popularity with contractors driving large tunnels. Loading in large drifts and tunnels is still divided between shovels and scraper-slides. A new type of slide has two stationary booms in front, one for each corner of the breast. A tail-block is attached to each boom, and a triple-drum hoist with two tail-ropes is used. By varying the tension on the tail-ropes the scraper can be set down at any desired point in the breast, and drilling eye-bolt holes is eliminated. Drilling these holes can also be eliminated by drilling the corner holes in the upper part of the breast 2 ft. deeper than the rest and not blasting the last 2 ft.

The use of three-drum scraper-hoists in loading from rooms has also gained favor, and they have to some extent replaced loading machines of other types.

Faster Drills with Automatic Feed

New models of faster-drilling machines continue to come out, but the changes in design are not radical. Drifters with automatic feed continue to increase in popularity in spite of the differential in price. Three kinds of automatic feed are in general use. In one the feed is actuated by a piston under air-pressure, in another group the actuating mechanism is an air-motor driving a feed-screw or rolling a pinion along a roller chain, and a third group has a ratchet mechanism operated by the vibration of the drill. The drills with automatic feed drill a little faster than those cranked by hand, and are much faster in changing steel, so that the hammer is hitting the steel a larger percentage of the shift.

New models of faster drilling machines continue to come out

Although air-pressures are much higher than they used to be, they have about reached their limit temporarily, because the materials of rock-drill construction are still not equal to pressures over 125 lb. per sq. in. Improvements in construction are continually being made, however, and it seems reasonable to predict that air-pressures will be raised as rapidly as the durability of rock-drills and drill-steel will permit.

One new stoper has been brought out by the Sullivan Machinery Co. It has an auxiliary feed-leg, by which the machine is prevented from falling, if the drill-steel breaks.

Detachable Bits Increasingly Popular

The use of detachable bits continues to increase, and of late greater attention has been paid to bit design, resulting in much longer bit-life. Refinements in gauging and in design have made possible a greater reduction in gauge-loss, which in turn has permitted drilling holes to greater depth and reduction in the diameter of the starters. This reduction in the starting size of the hole has automatically increased drilling-speed through reduction in the volume of rock removed.

Two types of bit have been evolved. One is short and wide, and is designed for use in brittle ground, where gauge loss is high and where a sharp cutting edge is unnecessary, as in the Tri-State zinc district. The other type is long and narrow, and is designed to give a maximum number of re-sharpenings, when gauge loss can be kept to a minimum. It was designed primarily for the Michigan copper mines. The standard design of bit most commonly seen is a compromise between these two types.

Some entirely new models of bits have made their appearance, and, though still in the experimental stage, show considerable promise. One of these, the Hokinson bit, uses a small chisel bit to drill a pilot-hole a fraction of an inch in front of a reamer, which enlarges the hole to full size. This bit has done some remarkably fast drilling in favorable ground with very slight loss of gauge, but has not yet been perfected.

The best method of sharpening detachable bits remains undecided. One group of users prefers wet grinding hard bit and another prefers to anneal the bits before grinding and to reharden them afterwards. A third group believes in hot milling. Each method has its advantages under favorable conditions. Various types of grinders and millers are on the market, and improvements are continually being made, but a perfect machine has not yet made its appearance. Improvements in grinding wheels have also been made, nearly doubling the life of the wheels.

Automatic hot miller for detachable bits

Threads and shanks on the "rods" to which the bits are attached are usually cut by a Toledo threading machine, built especially for this purpose, but are also successfully forged on a drill sharpener. Electric furnaces are generally used for heating bits and rods for annealing and tempering, because the temperature can be so accurately controlled and because there is so little decarbonization of the steel.

Greater emphasis is now also placed on the proper pointing and spacing of holes as well as on drilling speed. It is obvious that holes drilled at an angle to the face will not carry as heavy a burden at the collar as at the bottom, and that an increase in the average burden on the hole is equivalent to a similar increase in drilling speed. Holes drilled at an angle to the face cannot carry as heavy a burden as those drilled parallel to the face. For this reason the effectiveness of drilling and blasting can sometimes be nearly doubled by better placing of holes, and some mining systems owe much of their superiority to this one characteristic.

Better Lighting Underground

In most of the large mines electric cap-lamps have been adopted as standard. Until recently only two kinds of reflector were furnished with these lamps, one of which concentrated the light in a very narrow beam and the other diffused it over a wide angle. The Bureau of Mines has experimented with reflectors giving different light densities, and it is now possible to get reflectors that will give satisfactory illumination under a variety of conditions.

It is generally conceded that plenty of light underground is the most important factor in preventing accidents. Flood-lighting of stopes and drifts is now common practice, and it is used with very beneficial results in shaft-sinking. In one shaft the boss was given a seat near a flood-light above the heads of his men, and from this position he could watch all the work and give warning if any danger threatened. A very enviable safety record was the result.

Ventilation and Dust Control

Controlled ventilation is now recognized as essential at all large mines, and the use of fans and air-doors is as common now as it was rare 20 years ago. The propeller-type fan, given the trade name of Aerodyne by the Jeffrey Mfg. Co., is particularly well-suited to mining conditions, and is now available in a variety of sizes. It is simple to install, maintains a high efficiency over a wide range of conditions, cannot be overloaded, and is reversed by merely reversing the motor.

Much progress has been made in the prevention of silicosis in underground workers. Good ventilation is still considered to be the first requisite. Dust-catchers have succeeded in reducing the dust produced in drilling, and an increase in the amount of water passing through the drill-steel or sprayed on the collar of the hole has also been helpful. Respirators of various kinds are used in many mines with success, but are not popular with the men. The most effective seems to be the air-line type, which delivers clean air to the worker under a slight pressure. Water-curtains and compressed-air water sprays keep down the dust count, and condensation of moisture in underground air, such as occurs in underground air-conditioning plants, has also been effective in removing dust. Apparently the worst dust conditions are brought about by blasting and not by drilling.

In the iron mines it has been found that exposure to the soft hematite dust of the soft ore mines counteracts to some extent the effect of exposure to dust in rock and hard ore, but perhaps the most promising development is the deliberate exposure of potential silicosis victims to a dust of metallic aluminum, as practiced at the McIntyre Porcupine mine. The aluminum apparently renders the silica dust innocuous.

Air-conditioning of deep mines has continued, and a number of large installations have been made. In some places the air is cooled before it enters the mine, but in very hot mines it is best to cool the air underground. One mine on the Rand in South Africa is trying out the use of dry compressed air for transmission of power

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to underground machinery because of the beneficial effect of the exhaust.

In conclusion, let me say that it is impossible for one man to keep track of all the improvements in practice and equipment that are continually being made, or to record them in the space and time alloted to me, and I hope that I shall be forgiven for any omission. I hope also that the mining men present will tell the meeting, in the discussion that is to follow, of the recent improvements that have come to their notice, and that have been overlooked in the resume just presented.

DISCUSSION

By J. FRED JOHNSON
American Smelting & Refining Co.
Salt Lake City, Utah

I THINK one of the most notable improvements we might ever look for in drilling was started by Mr. Eaton—namely, the use of diamond drills in stoping operations, applied frequently in Canadian mines. They are using some of the smaller types of drills that have been brought out.

At the Boston Con mine at Bingham, one of the diamond drill companies has been experimenting with a drill which has a motor in it as an integral part, and this drill revolves at the rate of 3,500 revolutions per minute as compared with 1,200 ordinarily used in diamond drilling. The machine is doing well enough and will be a success, thus eliminating compressing pipelines, etc. I think within the next five years we will probably see the thing work out to be a commercial success.

With regard to improvements in mining, I think that the experience that we have had in Nicaragua illustrates this very well. In 1914 an American mining company went down in the same district in which we have recently built a mill. This mining company built a 100-ton mill, transporting everything in by river transportation. They started out on a large launch and finally they had to take this machinery in by using two or three canoes. It took them two years to build a 100-ton mill. We built a 300-ton mill there, carrying everything in by airplane at a cost of $50 a ton, and we built a 300-ton mill in six months.

By GUY N. BJORGE
General Manager
Homestake Mining Co.

THE newest bit of equipment that we have at Homestake that has given us very satisfactory results in operation is a close-coupled radio system for signalling from the cage, whether stationary or moving, to the hoisting engineer. I can't go into any of the details of the electrical side of it, but there is a microphone on the cage wired to a coil clamped around the hoisting cable just above the cage. The words jump from this coil to the cable and are picked off the cable by a similar coil immediately under the head shield and is then wired from the necessary radio equipment to the hoisting engineer. When we first began using it about a year ago we used it with bell signals. Some five or six months ago we changed over to voice. The primary purpose in developing that was the idea of safety, that it would be a safer operation if the cager could be in constant communication with the hoisting engineer.

Since it has been in operation we have found it to be a great time saver. We still use the code signals, but it is very much faster to have the cager say "74" than to ring seven bells, stop, and ring four more. In another way, if he is on the bottom level, between that and the collar, and signals go to the collar of the shaft, in the old system he would go to the collar regardless. He might, just after starting, receive a call from the 3,500-ft. level. With this system he simply corrects his signal to the hoisting engineer and they stop at the 3,500-ft. level, or anywhere else along the line. The system can be made two-way, but so far we are only using it one way. It has been in successful operation now for a number of months, and all the hoisting engineers and cagers have been unanimous in their preference for it from the very day it was placed in operation.

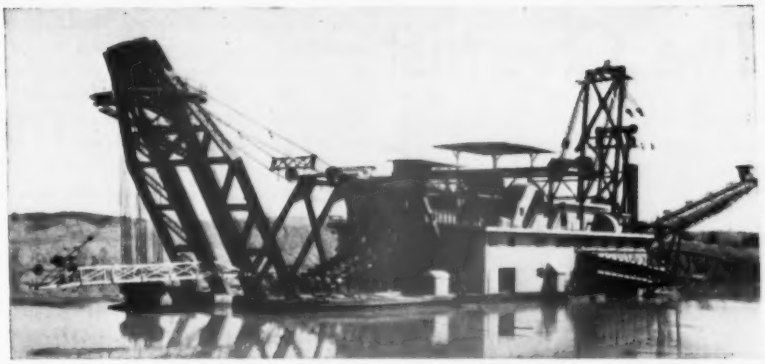
By ROSS D. LEISK
General Manager
Sunshine Mining Co.

ON THE subject of detachable bits and sharpening, I think one interesting thing that we have found at the Sunshine is that in hot milling we are able to bring a bit back to gauge; for instance, starting with a 2⅛-in. starter, we dull it when it is hot milled. We can frequently bring it back to 2⅛, and sometimes it can be done twice, depending on the wear. That can be repeated on down the line so that we can get up to eight usages. Formerly all of our bits were ground, but now they are all being hot milled and tempered. The advantage that we have found is in the increased number of usages.

By H. A. SAWIN
Sales Engineer
Yuba Mfg. Co.
(*Written*)

MINING dredges have kept apace with the modern trend to larger, heavier excavating units, whose purpose in most branches of the industry is to lower unit costs by handling greater volume and thereby make profitable the mining of lower grade gravel than was formerly practicable. The trend to larger dredges has not been entirely for the purpose of handling bigger yardage. Dredges, being floating machines, although land-locked on their own ponds in many instances, of necessity become larger in hull block as the extra weight necessary for deeper digging units must be counterbalanced with extra buoyancy. American-built dredges displacing approximately 3,500 and 3,750 tons are operating profitably in California gold fields, and others of English construction are being built for tin dredging in Malaya. Dredges of this size cost a great amount of money, well over $1,000,000. Economic forces rather than mechanical problems limit their size.

The modern dredge is a marvel of efficiency, and it is only necessary to



Deep digging to depths of 112 ft. below water level is successfully conducted on the Yuba No. 17 dredge near Hammonton, Calif.

point out that ore (gravel to the dredgeman) worth 10 cents per cubic yard and less can be mined profitably at depths of over 150 ft. below ground level. To carry the load of an investment such as I mentioned, this gravel must be handled continuously and in paying volumes. Coordination of the four units of a dredge—digging, classifying, metal recovery, and disposal of tailings—is necessary for success. Also, correct design is most important.

Deep digging, 112 ft. and 124 ft. below water level, is successfully conducted on two California Yuba dredges, Yuba No. 17 and No. 20. Because of the more compact gravel at these depths, and because the ground seems to become highly abrasive at greater depths, the actual yardage dug is reduced somewhat below that of dredges having buckets of the same size but digging only 80 ft. below water level. No digging is done while raising the ladder for daily inspection and greasing. Time consumed at each raising is 9 or 10 minutes, more than double that for shorter ladders.

Yuba No. 20 ladder is 216 ft. long, and the dredge is designed to operate with the ladder at 45° to the pond level. This is considered good American practice, but is not always followed abroad. Long ladders cost more, but provide better operating conditions. Buckets with rivetless-type lips have been greatly improved recently, and better foundry practice makes it possible to change lips in the line without removing the buckets. A full line can often be changed in less than the time required for weekly clean-up.

Jigs have been adapted to advantage on several dredges. Pan-American Placer jigs especially have received much attention from dredgemen, and are used in conjunction with several types of cleaner jigs, ball mills, and amalgamaters. Many dredgemen of long experience hold the opinion that plenty of table area proper arranged is still the answer to efficient gold recovery. This is probably true where gold is clean and amalgamates readily. Otherwise jigs have a place in the industry and are used as a complete recovery system on at least one large dredge, and in series with riffles on several others. Jigs are used as primary gold savers ahead of riffles, and also as secondary units after riffles. Molded rubber riffles with practically no life limit are finding favor for use on dredges built for long service. Rubber sluice linings and housings are finding favor also. Rubber seals for use on bearings below water are used successfully.

Changes in drives have been made in recent years, tending to eliminate large main drive belts. Modern dredge screens and winches have been equipped with direct-connected motors and multiple V-belt drives. Both d.c. and a.c. electric units are used. Yuba No. 20 and Capital No. 4 main drive motors are in pairs, one on each side of the upper tumbler and just in back of it. These dredges use a.c. equipment, and the two motors in each case are synchronized sufficiently to avoid lagging on one side and consequent overloading on the other. Yuba No. 20 motors are 300 hp. each with a speed of 580 r.p.m. Power is transmitted by V-belts to the pulley shaft, and thence by two gear trains to bull gears on the upper tumbler shaft which is 3.5 r.p.m.

Screens and winch units are V-belt driven on some new dredges, and have found sufficient favor to be specified on several recently rebuilt dredges. Separate ladder hoist winches are now used quite generally, especially on deep-digging dredges. With nearly a thousand tons suspended, it becomes quite evident why these ladder hoist winches have become the subject of much thought, especially the control features necessary to avoid too fast and accidental lowering of the ladders.

New steels with abrasion-resisting qualities have been generally accepted by dredgemen for screen use. Many types of bucket pin-locking devices are offered, but in this country they have not been taken up. In the Orient, especially on tin dredges, one type or another of pin-locking device seems to be desired. "Too much bother" and "Cost more than they are worth" is the American slant, perhaps because replacements are not the problem here that they are to operators abroad.

One problem brought about by deep dredging—namely, proper control of bucket-line catenary—has been solved through the use of the Perry Patented Bucket Idler. Several of these are now in use and contribute much to successful dredging at depths of 80 ft. or more below pond level. The Yuba mud-pumping system is largely responsible, along with the Perry Idler, for the success of Yuba No. 17 and No. 20. This system removes fine silt and mud which settles into the pond bottom from behind the lower tumbler. This fine muck is pumped up the digging ladder through a special piping system and out over the stacker or through a pipe line to some point far from the dredge pond where it can cause no more trouble.

Concluding, I might call attention to the danger of possible over-refinements of dredging equipment. Simplicity of design means longer daily operating time. Dredge units are on the whole slow-motion machines. Strength and ruggedness are the main requirements. "Gadgets" and machinery requiring constant attention and many repairs cost real hard cash in the form of lost operating time. Gold or tin or platinum not dug today, because of an avoidable shutdown, is not recovered until the very end of the operating life. The interest on that potential recovery is lost until then. The remedy for lost time is simplicity, strength, and continuous operation—experience proves the truth of this.

By ROBERT S. LEWIS
Professor of Mining
University of Utah

(*Written*)

MR. EATON refers to the use of cut-and-fill mining, especially in regard to replacing shrinkage in order to reduce the dilution caused by weak walls. At one mine relatively narrow veins with quite weak walls have been successfully mined by cut-and-fill stoping by carrying short

(*Continued on page* 48)

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Gas generator blasting directly to the air—a process for removing unnecessary gases in producing synthetic ammonia and synthetic alcohol

The Chemist in the Coal Bin

● ***Developments During the Past Several Decades in Chemical Research Hold Promise of Expanding Coal's Use as Raw Material in the Chemical Industry***

By CHARLES M. HACKETT
E. I. du Pont de Nemours & Co., Inc.

NOT far from Charleston, in West Virginia's coal-veined hills, a huge industrial plant spreads over acres of land that not many years ago was a farm. Its business is the production of chemical products by a technique called high-pressure synthesis. In its vessels of massive metal brews the stuff of a changing world, the turning of plentiful resources—air, water and coal—to uses once undreamed. The location of the du Pont's Belle Works, in the heart of a great coal region, is no chance decision. For, everyday, enough coal is coked here to heat the average American home for 100 bleak winters.

Some economists of the coal industry view this spectacle as a hopeful sign, one of the few bright rays gleaming through the dusk of the mines. In the wonders that emerge today from the chemist's test tubes, many predict the salvation of the coal industry.

A few months ago, du Pont scientists announced to the world an entirely new material which they named nylon. It has, potentially, hundreds of uses, notably in making sheer hosiery. It is the first man-made organic textile fibre prepared wholly from the mineral kingdom; basically its composition is coal, water and air.

The debut of this aristocrat among chemical materials marks another step in the development of coal-derived products. Nylon now heads a long list, as it joins with dyes, perfumes, fertilizers, refrigerants, plastics and a host of lesser satelites. And the number grows constantly as research goes forward.

Coal to the chemist is not only energy, but carbon, key element in no less than 500,000 known chemical substances. Chemists say the possible total of carbon compounds runs into astronomical figures. Thus the chemistry of coal is a chemistry of limitless frontiers.

Coal, water and air, plus the marvels of present day chemistry, combine to make Nylon—the first synthetic textile fibre prepared wholly from the mineral kingdom. Note sheerness of hosiery spun from Nylon yarn

Coal, as chemists see it today, is the poor little rich boy of American industry. Some day it will come into vast wealth. In the meanwhile, it suffers from malnutrition, and is looking toward chemistry for one form of nurture.

Already the chemist has come a long way in directing coal into new uses. Exact tonnage is difficult to allocate, but estimates indicate that for all chemical purposes, it is finding markets for some 50,000,000 tons, or better than 10 percent of the total. To what extent this can be increased, or how quickly, few will venture prophecy. There are chemists, however, who predict that the day is not far off when it will become an offense against the public policy to burn raw coal indiscriminately, so valuable will it be as a chemical material, just as a few hundred years ago the city of London forbade its burning as a "heathen custom."

Although bituminous coal production declined from 568,000,000 of tons in 1920 to some 450,000,000 of tons last year, the output of coal tar, the starting point for many chemical products, rose from 360,000,000 gallons, to over 560,000,000 gallons. This inverse ratio of coal production to coal tar production is seen as an optimistic index of things to come.

Coal, Water and Air

High-pressure synthesis today outranks even coal tar chemistry in its possibilities. This process, beginning as

a synthetic source of nitrogen for fertilizer, has experienced a mushroom development in the past few years. At the Belle plant, more than 100 different products have been born of the process since it was introduced a few years ago.

A very pressing human need fathered the taking of nitrogen from the air. For years, natural deposits in Chile had furnished a world grown increasingly dependent upon its slender supply. Nitrates are indispensable in the manufacture of plastics, explosives and other material, but the soil is their most vital sphere, for without nitrogen, plants will not grow. Fears that a great famine might result from the lack of sufficient nitrogen for agriculture were often oviced—most spectacularly in an address in 1898 by Sir William Crookes, famed British scientist.

Coal, air and water, have banished this bugaboo of past generations. A constant and cheap supply of nitrogen is at hand, and fertilizers of widely varying type may be procured readily.

The root of the system is hydrogen from water, nitrogen from the air. Ubiquitous coal brings about the union. And with coal, chemistry can blow hot or cold. Ammonia changing from a liquid to a gas absorbs heat, lowers the temperature and provides refrigeration. Yet the same technique can be utilized to produce methyl alcohol, an antifreeze to keep the American motor car from freezing in winter.

Coal has helped to make fertilizer for more than a quarter of a century. In the coking process, ammonia liquor is recovered. It combines with sulfuric acid to form sulfate of ammonia. This has long been a standard farm fertilizer.

The urea fertilizers, made synthetically from the three components—coal, air and water—are now coming into general use. They contain the highest percentage of nitrogen of any commercial fertilizer.

It, too, is already beginning to stray far afield in finding other jobs to do. Urea-formaldehyde resins form some of the most useful of plastics, and are now invading the territory of paints and finishes. Both the urea and the formaldehyde, each stemming from coal, show inclinations to broaden their already considerable talents. Chemists see this gregarious pair, both in harness and singly, as materials of great promise.

Chemists know that the age of plastics, in spite of progress already recorded, has scarcely begun. The coal beds of America are finding new outlets in this field every year. Nearly all of the leading plastics are in some way coal's children. The methacrylate resins come from methanol, an outgrowth of the synthetic ammonia process. Phenol-formaldehyde resins, one of the first, are based, as the name indicates, on products of coal.

Recently, a group of scientists gathered in Washington at a banquet, closing the celebration of the 100th birthday of the U. S. Patent Office. Two large ornamental spheres were displayed on a velvet-draped dais. Guards stood by, for one of the two sparkling balls was a fine specimen of rock crystal, valued at more than $50,000. Its apparently identical companion was a plastic, made from coal with the aid of water and air. If dropped to the floor, unlike the rock crystal, it would have rolled away unharmed. Hundreds could be made at the cost of the rock crystal. And no eye in the room could tell which of the spheres in this tableau was the work of nature, which was man's.

Plastic chemistry is a powerful democratizing influence. Once only the wealthy could own rock crystal, jade, amber and other semi-precious materials. The chemist cannot only duplicate them, he makes them available for everyone, and for hundreds of humble purposes.

Rubber Without a Tree

Where coal joins with air and water to forge one chain of discovery, in another du Pont plant a second triple alliance has been effected. Coal, limestone and salt combine to form neoprene, a chemically made rubber. Neoprene is frequently, and erroneously, designated as synthetic rubber. It is a wholly new, man-made substance, finding no counterpart in nature, possessing the essential properties of rubber, and in addition, a number of qualities topping the natural product's. It resists oil and grease, to which rubber is easy prey, can withstand sunlight to a much greater degree, and age does not wither it either in strength or in appearance.

Coal Tar

From coal tar is produced an almost endless procession of chemical products, completely dominating some fields. In medicine, for example, domestic production of coal tar medicinals in 1937 was 14,799,771 pounds, while the non-coal tar compounds did not exceed 2,000,000 pounds. Altogether the sales of products from coal tar alone in the U. S., during that year reached a figure of $127,414,347.

Dyestuffs offer a picturesque example of the growth of coal as a chemical source. Natural dyes, derived from vegetable or animal sources, had the field almost to themselves well into the present era. Many had to be imported, expensively, from Africa and Asia. Today American factories turn out a complete rainbow of bright fast colors, at a fraction of the cost once paid for inferior colors. Most of this has come about during the lifetime of those still in their twenties. In 1914, an authority in the industry listed 1,001 dyes of separate chemical identities. Most were made in Germany; the U. S. produced only 104. At present, the du Pont Company alone turns out as many kinds of dyes as did the entire world 25 years ago. Some 5,000 colors and more than 100,000 shades are made by American dyemakers.

The Pot of Gold Finds a Rainbow

What is present in coal is a miscellaneous collection of chemical compounds subject to wide transformation. There is no alchemist's formula to chart this intricate labyrinth. Only endless research and cooperative effort have accomplished the result. Reversing the old adage, the rainbow has appeared only after the pot of gold—and a large one—has been put into it. The du Pont Company, one of our largest dye makers, invested more than $43,000,000 and many years of work in dyes before earnings equaled the accumulated losses of learning how to make them.

So prolific is coal in its chemical progressions, that the methods, once understood, are relatively simple. When coal is baked or "coked," one of the substances coming out is a sticky sour-smelling mass called coal tar. This disagreeable ooze, when distilled, yields various carbon compounds. These are converted into "intermediates," and are used as raw materials for further elaboration into a large variety of products. Although all of them together make up only 1 percent, by bulk, of the original coal, they are so rich in chemical possibilities that their ultimate uses have not yet been fully realized.

Versatile Compounds

The "crudes" or intermediates when purified are either colorless liquids or white crystalline solids. They give little evidence of the precocious children which spring from their union with other chemicals. For when these

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Crude or intermediate coal tar products are transformed by the chemist into exotic perfumes

liquids and crystals are transformed by the chemist, not only dyes but a wide diversity of things results: perfumes, flavorings for food and tobacco, medicines to comfort the ill.

Drugs and Serums

Coal has made important contributions to the materia medica of the war on disease as the chemist has joined forces with the physician. Improved anesthetics such as the novocaine for the dental ordeal and the aspirin that we take for headaches are common examples. Drugs for allaying fever, such as acetanilide, and synthetic urea have recently shown promise in the medical field. One of the first and most famous of medicinals based on coal was Salvarsan, the specific for syphilis, discovered by the German chemist, Ehrlich. Chemical research has since reduced the price of this synthetic drug from $3.50 to 20 cents a treatment.

Sulfapyridine, a cousin to the famed sulphanilamide, and like it a coal derivative, is the most recent discovery of note. Johns Hopkins Hospital has reported it to be effective in pneumonia, and there are hopes that it may prove of value in tuberculosis. The medical profession has issued stern warning against the "cure-all" use of sulphanilamide, but it has shown results in the treatment of many diseases, including such streptococcus infections as peritonitis, "blood poisoning," childbirth fever and lately in effectively combating venereal disease. A very minor item in 1936, this drug showed sales a year later of 267,104 pounds, valued at $1,322,412.

Synthetic urea, previously mentioned in relation to fertilizer, is performing important therapeutic duties, conspicuously in treating stubborn wounds, ulcers, gangrene and bone diseases.

New Methods, New Markets

Research goes on constantly. Production of liquid fuels and oils from coal is one development, with the prospect that the fuel could be piped to market. Recovery of sulphur from the stacks of mill and power plant is another in which chemists see an outlet for coal's values. In thousands of laboratories, the search goes on as investigators seek out new products, new plants, new jobs, new payrolls—where none existed before.

Germany now actually is producing from coal more than a billion gallons of gasoline yearly, at a cost, however, several times that of petroleum gasoline. England, too, is manufacturing the "Liquid coal." In the United States with our vast oil reserves, we have been only casually concerned in this development, but recently the Bureau of Mines opened an experimental plant in Pittsburgh to make oil and gasoline from American coals by the Berguis process. This is a step in preparedness, because while experts disagree widely on the probable life of our oil deposits they all agree that they will not last indefinitely. In the opinion of the Bureau of Mines expert, Dr. Arno C. Fieldner, "the nation's proved oil supply can be depended on for only the next 15 years."

Air Hygiene Meeting

The fourth annual meeting of Air Hygiene Foundation, geared to show that "healthy workers make for healthy business," will be held at Mellon Institute, Pittsburgh, November 14-15. Dr. H. B. Meller, managing director, announces that the amount of information available forces expansion of the program from a one-day to a two-day session this year. He warns that stepped up production will intensify industrial health needs.

Reports on the Foundation's medical and engineering research, including latest advances in employe health protection, and reports on the impact of health on employer-employe relations, will be made to representatives of the 200 industrial concerns affiliated with the Foundation.

Andrew Fletcher, of New York, vice president of St. Joseph Lead Company, will point to specific dollar-and-cents savings resulting from proper health precautions, showing that aside from all the other factors "good health is good business."

A forum is planned to show that "Industrial Health Pays Double Dividends": (1) Economic savings; (2) improvement in labor relations and public good will. V. P. Ahearn, of Washington, executive secretary of the National Industrial Sand Association, will preside.

Robert J. Watt of the American Federation of Labor, and representative of the U. S. Labor Department at the International Labor Office, Geneva, is scheduled to speak on labor's interest in occupational disease prevention.

Dr. A. J. Lanza, of New York, Assistant Medical Director of Metropolitan Life Insurance Company, will preside at a symposium on absenteeism, intended to develop measures for companies to reduce time lost by employes through illness. Dr. R. R. Sayers, of the Public Health Service, and medical directors of half a dozen leading corporations will participate.

The technical program includes: Reports on Foundation's engineering research at Harvard by Philip Drinker, Chairman of the Preventive Engineering Committee; reports on Foundation's medical research at The Saranac Laboratory by Dr. L. U. Gardner, and at the University of Pennsylvania by Dr. E. P. Pendergrass and Dr. Eliot R. Clark; and reports on legal developments affecting industrial hygiene during 1939, by T. C. Waters, of Baltimore, a member of the Foundation's Legal Committee.

An Appraisal of the Guffey Act and Need for Its Amendment*

By HON. CHESTER THOMPSON
Former Member of Congress
from Rock Island, Ill.

WITHOUT a constant and unfailing supply of energy, no commerce or industry can exist in this or any other nation of the world. Without it, civilization, our very living, would be impossible; so it is natural that we should be vitally interested in any and all matters affecting an important—in fact, the most important—source of energy. That is why, in the wise judgment of the leaders of this fine organization, a discussion of bituminous coal is having what might be properly termed, in the language of the theater and circus folks, "top billing" at this convention or annual meeting.

Those of us who are interested in the success of river transportation cannot overlook the importance of soft coal in the channels of such transportation and its effect upon those communities and those industries which have a right to look to water transportation of their energy sources, as well as their other raw materials and finished products, in their efforts to compete in the markets—all of the markets—of this country and of the world.

Many new and fine industrial plants have been built in recent years in locations where water transportation is available, for the same reasons that our forefathers built the great cities of the United States where such form of transportation was accessible. Community life has benefited by such placement of new plants and businesses, as well as by the expansion of existing facilities—new homes, new schools, new retail businesses have been substantially added to existing cities and towns along the navigable streams of the nation. The threat to wipe out any advantages that low-cost water transportation affords such communities, be they large or small, will be, and is so regarded by all thinking business men as being, a real danger demanding the entire attention of all who are in a position to do something about it. The very economic existence of some industrial centers located on the rivers of the Middle West is seriously threatened by the proposal of the Federal Government to establish minimum prices on soft coal under the so-called Guffey Coal Act of 1937, now being administered by the Bituminous Coal Division of the United States Department of the Interior.

Far-Reaching Effects of Coal Act

To say that it is alarming that such a small number—comparatively speaking, at least—of business men and industrial leaders seem to realize the far-reaching effects of the Coal Act is understatement. In an effort to bring the importance of this question to the attention of those in attendance here and through them to the "folks back home," I will devote the balance of the time allotted me to a discussion of the history of coal legislation, to the efforts—yes, the futile efforts—that have been made to put it into effect, and to the result, if such efforts be successful, upon business and industry of the great Mississippi Valley.

During the World War days of 1917 and 1918 we had a Federal Fuel Administrator (as a war measure, of course), whose duty it was to conserve the coal resources of the nation, to see that those industries working on war necessities had ample supplies of coal and to regulate the top or maximum price of coal for both industrial and domestic uses. Unquestionably this was necessary and I do not know of anyone in the coal industry or elsewhere who complained much about such governmental control of a basic industry as *strictly* a war measure.

If war again comes to us, undoubtedly some similar arrangement will have to be made in order to conserve the coal resources of the nation and guarantee, as far as is possible, the proper supply of this all-important fuel to those most needing it for the successful defense of the United States, and at the same time see that the domestic needs of our people are taken care of at a reasonable price. War naturally changes everything; in fact, constitutional government is practically set aside and all are expected to devote their every energy to the success of it. And in this, we Americans have never failed *and never will!*

Resume of Recent Coal Control Efforts

The first peace-time effort to fix prices and control the coal industry by governmental mandate came under the ill-fated NRA of 1933. Of course, under that law the coal code authorities were set up to determine costs and selling expenses, and thus fix prices. The soft coal industry had been losing money during the late twenties and early thirties, so the fixed prices under the NRA codes with the increased business that came in late 1933 and in 1934 looked good to many coal operators—in other words, they had "tasted of the apple." It

* Presented to Annual Convention of the Mississippi Valley Association, St. Louis, Mo., Oct. 16, 1939.

should be pointed out, however, that under the coal codes of the NRA there was no frozen price condition, and operators entered into term contracts with consumers, distributors and jobbers. When the coal codes "blew up" and the Act itself was thrown out by the Supreme Court in the Schechter Case, there was a complete collapse of price-fixing and no more contracts were consummated at prices and under conditions that satisfied either the producers or the consumers. To say that chaos prevailed in the basic industry of soft coal is putting it mildly. But the seed was planted, and so it was little wonder that the Congress was asked to enact the first Guffey Coal Act, better known as the Snyder-Guffey Act of 1935. This measure contained provisions relating to labor used in the mining of coal, and in a short time it was also declared unconstitutional on the grounds that the mining of coal itself did not constitute interstate commerce, and therefore was beyond the power of Congress to regulate. This happened in 1936, and an effort was made in the closing days of Congress of that year to pass another coal law without the labor provisions, but it failed in the Senate of the United States, and the Seventy-fourth Congress adjourned *sine die* without any valid coal-control legislation on the statute books of the nation.

After the elections of 1936 and the convening of the Seventy-fifth Congress in January of 1937, a new bill similar in practically every respect to the one that failed in the previous Congress was introduced, and with little or no active opposition passed and became law on April 26, 1937, upon the signature of the President. That is the present law, and since that date efforts have been made to carry out the purposes thereof with no success as yet, but with millions of dollars of expense to the consumers and the operators, as well as to the Government itself. In other words, the whole affair has been a headache to all having anything to do with it, and it will be worse than a headache to consumers if it ever does become effective and minimum prices are established and sustained.

I was a member of the House Committee on Ways and Means during all the consideration of coal-control measures, and I am proud that I can state to this group today that I did, to the best of my ability, oppose them for the reason that I thought this type of legislation unsound and unworkable. It is unfair to both consumers and producers, and in turn to employers and workers throughout the land. If you will pardon a personal reference, it is mighty gratifying to see, by actual experience, my legislative prediction come true.

Provisions of Guffey Act

Since July 1, the Coal Act of 1937 has been administered by the Bituminous Coal Division of the Department of the Interior. I am generous in employing the word "administered." The Coal Division is successor to the lately dissolved National Bituminous Coal Commission. The transferral of authority was a part of the President's program of administrative readjustments under the Reorganization Act of 1939. The Guffey Act sets up an elaborate machinery of 23 expensive District Boards, and re-maps the country into "marketing areas."

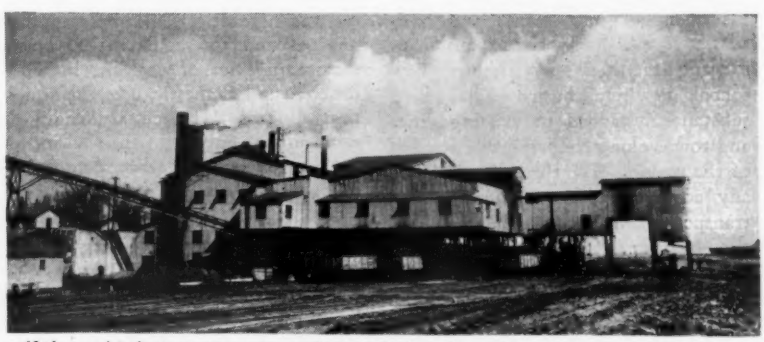
These District Boards are elected in the 23 districts by producers upon a tonnage basis, and by representatives of labor. Their expenses, including attorney's fees, are borne by assessment against the tonnage produced by companies and individuals in such districts. Generally speaking, the assessments have amounted to more than 1 cent per ton. This is in addition to the 1-cent-per-ton Federal excise tax levied by the Coal Act itself and collected upon every ton of coal produced for domestic or industrial purposes in the United States. It should be noted that the soft coal industry is the only business in the United States that is subjected to a special tax for its own regulation and policing by a Government agency.

Beginning in April of 1937, the now defunct and abandoned National Bituminous Coal Commission worked on a set of coal prices and attempted to put them into effect on December 16 of that year. There was a furious storm of protest. Many consumers, communities, and railroads, as well as producers, went to court, and the Commission got "cold feet" and withdrew such prices in February of 1938. They had been in effect only 72 days.

Price Coordination Taken Over by Commission

The Commission then continued its processes of attempting to have the District Boards promulgate prices and coordinate prices among various districts from which coal flowed into common consuming markets. The law contemplates that the District Boards themselves should do the coordinating of prices, but in this they utterly failed. The result has been that the Coal Commission was obliged to take over such work before setting prices for final hearings, as provided in the law. Even before the Commission did publish such prices, the order for its abolition was issued by the President and approved by Congress, and since July 1 the Coal Division in the Interior Department has been working on the problem.

The Coal Division began hearings before a Board of Examiners on July 24 of this year, and at that time intimated that the hearings would not last more than three or four weeks. They are still going strong, and attorneys and others familiar with the processes and procedures do not hesitate to say that such hearings are slightly more than one-third complete, certainly not more than one-half even today. Now this means that minimum prices cannot be proclaimed under the Act until at least after January 1. Doesn't this seem to prove conclusively the impossibility of fixing minimum prices by Government mandate? Especially is this belief strengthened when it is recalled that one or another



If the coal industry is to survive and meet the inroads made on it by competing forces of energy, it must be given a free hand to meet competitive conditions as they exist in different sections of the country and in different markets, says Mr. Thompson

agency of Government has been working—rather, playing—with price-fixing since the early part of 1937, with no tangible results other than prolonging a distressed, chaotic condition, inflicted upon an industry all-important and wholly vital to our national economy, by the uncertainty and inflexibility of the operation of this ridiculous law.

The crux of the statutory abomination is without a doubt the provision that minimum prices shall reflect the relative market values of all sizes and qualities of coal, taking into account transportation methods and charges and their effects upon a reasonable opportunity to compete on a fair basis, and at the same time preserve as nearly as possible existing fair competitive opportunities with due regard to the interest of the consuming public. It is fair to point out that practically all other attempts at governmental price-fixing were in the direction of fixing maximum or ceiling prices, but that under the present Coal Act the effort is confined entirely to the fixing of minimum prices, or the fixing of a floor below which coal prices cannot fall. There is a provision in the statute about maximum prices, but maximum prices cannot be established or fixed under this law until after minimum prices are determined and published, for such maximum prices must bear a definite relationship to the minimum prices. It is mentioned in the statute that prices must in addition to reflecting relative market values, be just and equitable among producers in a single district and between producers in districts whose commodity meets in a common consuming marketing area.

Vital Transportation Considerations

The law further provides that the Coal Division shall fix the tipple price of bituminous coal, commonly called f.o.b. mine price; and in order to meet the other provisions of the law that coal must flow into common marketing areas upon a relative value basis, the transportation of coal therefore becomes a most vital factor in determining the f.o.b. mine price. In other words, if a mine is located, say, three hundred miles from a certain market, it would probably carry a freight charge of maybe $2.50 a ton; whereas a mine less than a hundred miles from the same market would only have to add a freight charge of $1 a ton. Assuming that these coals are the same in analyses—have the same burning qualities, the same amount of ash, and practically the same number of B.t.u.'s—the coal at the nearby mine would, under the interpretation placed upon the law by those charged with administering it, have to be increased $1.50 per ton f.o.b. mine in order to meet the requirements of the law.

It will be immediately seen that this is the application, pure and simple, of the now-discredited Pittsburgh-plus system about which so much complaint was made many years ago in the steel industry. It will also be observed that this practice, if it becomes effective, totally destroys the benefits accruing to any business or industry, as well as to any mine owner or employe thereof, because of proximity to market. Many large industries have been built close to good coal fields because of the advantage of obtaining fuel at low costs, principally because of the small amount of transportation involved, and if this Coal Act is permitted to stand as it is, all of those advantages will be completely destroyed, and naturally the investments made therein practically dissipated.

The transportation of soft coal has reached major importance in the waterways system of the nation, as it has long been important in the matter of intercoastal shipping. Hence it is obvious that this group must be vitally interested in the administration of any law that seeks to destroy the advantages of cheap water transportation to communities and industries situated so as to reap the advantages of low-cost water-borne transportation.

I do not have the exact amount of coal, in tons, that has moved on the inland waterways system of the nation during the last year, but I do know that it is substantially increasing each and every year, and that thousands and thousands of barges of coal have moved out of West Virginia, Pennsylvania, Kentucky, and Ohio into the Ohio River, destined to practically all sections of the United States. Likewise, hundreds of thousands of tons of coal have come from the fields of Illinois, Indiana, and other States adjacent to the waterways system of the country. Many large expenditures of funds have been made not only by the water-carriers themselves, but also by communities, industries, and coal dealers along the rivers in building and maintaining special facilities for the economical handling of coal by barge. To destroy these is practically to wipe out the investments and otherwise seriously to handicap those cities and towns which have seen fit to spend their money in order to obtain soft coal, their principal source of energy, at a reasonable price, in turn permitting them to compete in the markets of America and of the whole world with their commodities, because of low-cost energy.

Relative Market Value Crux of Act

I mentioned the fact that the crux of the Coal Act is that question of relative market value. Unfortunately, Congress did not clearly define it in the organic Coal Act, and many variant interpretations have thus been placed upon the language. It is contended by some that there is no difference in coal, whether it move to market by rail, by truck, or by water-carrier,—in other words, "coal is coal." A careful analysis of this situation definitely reveals that this is not a fact, that there is a distinct difference in the relative value of coal because of the means employed to carry it to market. For instance, coal that is transported by water gets extra handling because it must be moved, usually by rail, from the tipple to the coal dock, which results in breaking, consequently changing the sizes and classifications of such coal. In order to handle coal economically by water it must be done by barge, which means larger storage facilities and, as I have pointed out, generally expensive unloading equipment. The fact is that water transportation while cheaper is much slower, and therefore exposes the fuel to the elements for a greater length of time; for when coal is piled in a barge perhaps for several weeks, it thereby causes heating to take place, which results in some deterioration of fuel energy. For this reason, those who desire to ship coal by water transportation are entitled to lower rates and thus to cheaper coal in any market into which that coal can be economically placed by reason of water facilities.

Opposition to Act Now Organized

Fortunately there are substantial numbers of producers in every coal-bearing State of the Union who earnestly oppose the principles of the Coal Act; who believe that the industry should be permitted to work out its own problems without interference by government. The fact that bituminous coal has lost a large tonnage to competing fuels, such as oil, natural gas, and hydro-electric power, has apparently been overlooked or disregarded by those individuals who sponsored, and are now supporting, the so-called Guffey Coal Act. If the coal

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industry is to survive and meet the inroads made on it by these competing forms of energy, it must be given a free hand to meet competitive conditions as they exist in different sections of the country and in different markets. Nor can the industry be tied down to a horizontal price, fixed by a bureau in Washington, without any apparent regard for many of the real problems of mining, transporting and consuming coal. Those opponents of the existing Act to whom I refer have formed an organization with headquarters in Washington—the Committee for Amendment of the Coal Act, for whom I speak. They are actively engaged in promoting amendments to the Coal Act which will do away with *all* price-fixing and the costly machinery therefor, including the extravagant District Boards, the tax on coal, and, more important, the expense of being obliged to defend themselves against unsound, unfair and inequitable orders, proclamations, and ukases of an agency of their Government charged with the dictatorial control of their business.

Provisions of Allen Bill

The program of this group is embodied in a bill (H. R. 6325) introduced in the House of Representatives by Representative Robert G. Allen of Pennsylvania, which is now pending before the House Committee on Ways and Means. They believe that this bill if enacted into law will save the bituminous coal industry from almost total destruction, or at least from complete socialization and regimentation, and will preserve the markets for soft coal against the inroads being made by other fuels.

The Allen Bill will completely remove any semblance of the Pittsburgh-plus system of pricing coal which, without a doubt, is most detrimental to water transportation of the nation.

It will give a minimum of governmental control over the industry through the approval of prices proposed by marketing agencies authorized to be set up as the need may present itself. The bituminous coal industry will be given a free opportunity further to develop its own business, to continue its vast employment of a minimum of half a million American citizens, and further to serve the consuming public of the nation by research work looking for additional uses of soft coal.

The Committee for Amendment of the Coal Act is thankful for the interest that the Mississippi Valley Association has taken in the current coal hearings now going on in the nation's capital, and is exceptionally pleased that the officers of your organization saw fit to intervene in these proceedings. This action on your part naturally costs time and money; but if the present Coal Act is permitted to stand such expenditure will be more or less continuous, because consumers and producers alike will be obliged to maintain a constant guard in Washington to preserve and protect their rights in the matter of coal prices.

Wouldn't it be much better to eliminate, by Congressional action, all reference to price-fixing and let a great industry, which through the years has proved its ability to supply the demands of American industry and the American people with fuel at a reasonable price, conduct its own business?

Let us hope, therefore, that the active support of your powerful organization will be continued in an effort to accomplish the enactment of the Allen Bill, and to do away with all the many objectionable features of experimentation with the price-fixing of a basic fuel upon a national basis.

TRUCK HAULAGE at the Mahnomen Mine

● ***Factors Determining Latest Truck Design on Cuyuna Range Outlined. Future for This Type Haulage Held Bright***

By W. H. GALLAGHER *
Chief Mechanical Engineer
Pickands, Mather and Company

DURING May of this year six trucks were received at the Mahnomen mine, Ironton, Minn., operated by Pickands, Mather & Company, to replace railroad haulage. These trucks are four-wheeled with 13.50 in.-24 in. dual tires on the rear and 12.00 in.-24 in. on the front. The gross load capacity is 62,000 lbs. and payload capacity 36,000 lbs. The 9-yd. water level capacity body is carried over the rear axels, is rear dump and scoop ended, and is raised and lowered by a horizontal, double-acting hydraulic cylinder through rocker arms. The engine is oil burning, 1,600 r.p.m. and delivers 185 hp. to the transmission. The transmission has eight forward speeds ranging from 3.3 to 31.4 miles per hour. The clutch is single plate. Interposed between the engine and clutch is a fluid coupling introduced to relieve shocks and give infinite rates of acceleration. Air brakes, electric starters and all usual auxiliaries are included. The cab is offset 14 in. to the left to give better vision while backing. It is planned to run these trucks up an 8 percent grade for a distance of 4,500 ft. to a crusher plant. It is estimated that the speed on this grade while fully loaded will be 8 miles per hour.

* Mr. Gallagher died suddenly early in July.

Advantages of Truck Over Railroad Haulage

From the time the Mesaba Range was opened in the early 90's, the ore in the open pits has been loaded directly into railroad cars and hauled by locomotive to the surface. However,

Mahnomen mine of Pickands, Mather & Co. on the Cuyuna range, Minnesota

in recent years, trucks have been creeping into the picture, and today most operators are considering their use and trying to determine what type and size of trucks to use. The shifting of tracks in the pit bottom and the time taken for switching in and out causes delays to shovel operations. Only a road is required for trucks, and if a sufficient number are available, there will always be one under the shovel dipper when it is ready to be tripped. Several shovels are usually spotted in the pit at various points to maintain the proper grade of ore. If the grade suddenly changes, the operation is moved to a new location which requires the moving of tracks with a resultant delay. Under these circumstances, trucks can be run to any point of the pit without delay.

Several combinations of equipment and plans of operation have been considered, such as loading the ore into trucks or wagons pulled by tractors which haul the ore to a belt conveyor which then carries it to surface, or specially designed electric trains which run on 8 or 10 percent grade. All these systems have their advantages, but trucks hauling the ore directly to surface appear most favorable both from an operating standpoint as well as investment standpoint.

Comparison of Requirements for Strip Coal and Iron Pit Use

Trucks have been used in strip coal mines for several years and are now considered the established means of haulage. The usual profile of the haulage route at a coal mine includes a 3 percent or 4 percent grade for about 1,000 ft. out of the pit, then a long level haul of one to three miles to a washing plant. Coal is relatively light, weighing about 50 lbs. per cu. ft. Under these conditions, it has been found that a large truck with maximum speed obtainable is the most economical. Semi-trailer trucks have been adopted at most mines, although in some cases trucks with a load carried directly on the rear axle are being used. The semi-trailer trucks consist of a driving unit with one end of the trailer resting on it just ahead of the rear axle.

The conditions in the iron ore pits are considerably different. The pits are 200 ft. to 400 ft. deep, which means that the problem is one of elevating. There are short level runs at the bottom of the pit, but with a vertical lift of 360 ft., as at the Mahnomen, on an 8 percent grade a road 4,500 ft. long is required. Iron ore weighs between 125 and 150 lbs. per cubic foot, which means that a considerable tonnage can be carried in a small volume. Taking these facts and the specifications of available engines, transmissions, rear axles, tires and purchase price into consideration, it develops that a four-wheel truck, carrying a gross load of 62,000 lbs. and a payload of 36,000 lbs. directly on the rear axle and driven by an engine delivering 185 hp. the largest available, to the transmission shaft was the most economical to operate and cost less.

Before arriving at this conclusion, the performance of all sorts and sizes of trucks driven by various sizes and types of engines were calculated. While the operating cost of some of these was very close to the one selected, the first cost was more, and the unit much larger and therefore more difficult to build than the smaller trucks with parts now available. It is also an advantage to have a fleet of several small trucks rather than a fleet of a few large trucks, for if one of the trucks is out of service, the carrying capacity of the fleet is not reduced as much.

Need for Mobility Eliminated Semi-Trailer Units

Four-wheel drive trucks were considered, but the extra first cost did not seem to justify the slight operating advantage with the probable upkeep. Semi-trailer trucks do not seem to fit into the picture. It is very desirable to have the trucks as mobile as possible for easy maneuvering in the pit bottom. This is not characteristic of a semi-trailer truck. It would be necessary to build the trailer very heavy to withstand the impacts of loading heavy ore. Dumping of the trailer is a problem. Bottom drop door cars have never handled ore satisfactorily and a bottom dump truck could not be used for dumping stripping. If an end dump was used, it would involve a dumping mechanism. All this would result in a large dead load at the sacrifice of payload. The purchase cost would be high. Trucks with tandem drive rear axles were considered and there is no reason why they could not operate satisfactorily but the single rear axle allows a shorter turning radius which is very desirable.

Trucks similar to those at the Mahnomen in general design and size, except with a smaller engine, have been operating very satisfactorily on the range for the last two years. Smaller trucks of various makes have also been used with success. These latter are standard trucks and are not as rugged as they should be.

Truck Capacity Related to Dipper Size

The Mesaba Range is equipped with a great many shovels with three and four yard dippers. The capacity of the trucks should then be of the proper size to accommodate multiples of these sizes. Three 3-yard dippers hold about 35,000 lbs. of ore and two 4-yard dippers about 32,000 lbs. Therefore, a truck of 36,000 lbs. payload capacity will be ample size for these two loads. With a load lighter than maximum, the truck will run up the grade faster so that there is no operating loss with the lighter loads.

The largest engine for trucks on the market was selected. This is an oil-burning, six cylinder Hesselman, 1,600 r.p.m. engine, capable of delivering 185 hp. to the transmission after power for all auxiliaries is deducted.

Hydraulic Coupling Relieves Shocks to All Truck Parts

To relieve the shocks to all parts of the truck during shifting of gears, and to give a wide range of accelerating rates, an hydraulic coupling was placed between the engine and the ordinary single plate clutch. This coupling was developed some 20 years ago in Europe for use in marine service in connection with the coupling of two Diesel engines to a single propeller to balance the load between the two. It has been used in London for over 10 years on busses and Diesel tram locomotives. The coupling consists of two parts—one connected to the engine and one connected to the plate clutch shaft. There is no mechanical connection between the two halves. The two are completely enclosed in an oil tight housing which is filled to two-thirds capacity. As the driving half revolves, the kinetic energy it imparts to the fluid is absorbed almost entirely by the driven half. At various speeds of the engine, different amounts of slip are obtained. Between 0 and 760 r.p.m. there is simply a drag between the two halves which increases gradually with engine speed. As the engine speed increases from 760 r.p.m., the slip decreases from 100 percent to 2 percent at 1,600 r.p.m. and 1½ percent at 1,800 r.p.m. the top speed of the engine. At 800 r.p.m., the slip is about 18 percent, at 1,200 r.p.m., 8 percent. This will therefore provide a cushion between the engine and the mechanical parts and ought to increase the life of all working parts and also make it possible to start under extreme loads and bad road conditions without shock. Shifting is done just as in an ordinary automobile.

Efficient truck transportation necessitates maintaining wide, smooth roads. Buildings on horizon are sintering and washing plant of Evergreen Mines Co.—the only sintering plant operating in the Lake Superior district

Gear Ratios and Speeds

There is a main and an auxiliary transmission. These provide eight speeds ahead and two in reverse. The highest gear ratio is 1 to 72.30 and the lowest 1 to 7.7. With rear axle ratios of 10.12 and 13.50 in. rear tires this gives speeds of between 3.3 miles per hour and 31.4 miles per hour. It may be advisable later to change the rear axle ratios if an economical speed cannot be obtained with the present ratios. The rear axle is fully housed, the load being carried on the housing which allows a full floating axle. The gears are double reduction. The rear tires are dual 13.50 in. x 24 in. According to manufacturers' rating, they are slightly overloaded, but this tire has given good service under similar conditions. The tire is the only part of the truck that is overloaded. Operating brakes are actuated by air and an auxiliary hand brake is applied to the main drive shaft. The frames are made of alloy steel.

As the use of trucks in the iron ore mines becomes more general, the operators will determine the best type and size of truck, and the manufacturers will gradually develop parts best suited for the needs of the industry.

Anaconda Increases Butte Operations

Heavy increase in demand for copper has resulted in reopening many of the Butte mines of Anaconda Copper Mining Company. During October the following mines resumed operation: The Leonard, Stewart and Badger copper mines, and the Emma zinc and manganese mine. The Emma is under lease by the Anaconda from Butte Copper & Zinc Co.

The four newly reopened mines will provide employment for 4,000 men in Anaconda operations in Montana.

Economic Effect of Present Taxes on the Mining Industry*

By W. H. HOOVER
Chief Western Counsel
Anaconda Copper Mining Co.

THE American Mining Congress in its "Declaration of Policy" of January 27, 1939, made the following, among other, recommendations to the Congress for changes in the Revenue Act of 1938:

1. Repeal of the remnant of the undistributed profits tax.
2. The re-establishment of the flat-rate tax on corporate income.
3. Carrying forward business losses of one year and deducting losses from future income.
4. Removal of the tax on dividends received by corporations.
5. Deduction of capital losses without limitation.
6. Repeal of the capital stock tax.
7. The elimination of needless complexities in the law, including the computation of taxable income in accordance with accepted accounting practices so as to conform more nearly to true income.

Many of the changes in the Revenue Act of 1939, effective June 29, 1939, are along the lines of the modifications urged by the Mining Congress.

Thus:

1. The 1939 Revenue Act eliminates from the Federal tax structure the undistributed profits tax and the dividends paid credit. The 19 percent tax, with the 2½ percent possible maximum credit, will be replaced by a flat 18 percent rate. This change does not, however, take effect until the taxable year beginning January 1, 1940. The change applies only to corporations earning more than $25,000. The tax on corporations earning less than this remains unchanged.

2. The flat rate tax on corporate income of corporations earning in excess of $25,000 for the years beginning January 1, 1940, is 18 percent. The rate for corporations earning less than $25,000 remains unchanged, that is, 12½ percent on the first $5,000, 14 percent on the next $15,000, and 16 percent on the balance.

3. One of the most important changes in the new law permits the carrying over of net operating losses to reduce taxable income for either or both of the two subsequent years. This change will apply to losses sustained in the current calendar year, and such losses may be applied against earnings in the years 1940 and 1941. Where fiscal years are used the same application will hold true for the fiscal years beginning in 1939, 1940 and 1941, respectively.

4. Under the 1938 Act corporations earning more than $25,000 were allowed the dividends received credit equal to 16½ percent of 85 percent of dividends received against the tentative 19 percent tax.

The new Act provides for the deduction of 85 percent of the dividends received in determining the normal taxable net income against which the 18 percent rate is applied.

5. The provision of the 1938 and previous revenue acts limiting to $2,000 the amount of capital losses in excess of capital gains that a corporation may deduct from ordinary income is repealed. Under the new law, effective for the taxable years after 1939, losses sustained by corporations on the sale or exchange of assets held more than 18 months will be deductible in full from earned income. Deductions of capital losses on transactions in assets held for 18 months or less will be limited to gains on similar short-term deals. The short-term losses in excess of short-term gains can be carried over to the next year to be used as a deduction against short-term capital gains for that year. Gains on sale of assets whether held more or less than 18 months will continue to be taxed in full.

6. Relief is afforded under the new tax law to corporations which in 1938 declared a too low capital stock value. A corporation will be permitted to make a new declaration in July, 1939, and July, 1940, provided the new declaration is greater than the value declared last July, adjusted to the date of the new declaration.

7. Another change in the 1939 Act gives all taxpayers the option to use the last-in first-out method of taking inventories, thus conforming, in that respect, taxable income to accept methods of accounting in arriving at income.

Changes Followed, in Part, A.M.C. Recommendations

It will thus be seen that in part at least the recommendations of the Mining Congress have been heeded by the recent Congress, and the changes indicate that the plea of the mining industry for a more rational basis of Federal taxation has been considered.

It is not the purpose of this discussion to undertake a detailed analysis of the present Revenue Act, or a comparison of this Act with those previously in effect, but it is rather the purpose to present broader considerations of the general economic effect of Federal taxation on the mining industry.

The elimination of the remnant of the undistributed profits tax to a large extent removes one serious handicap to the development of the mining industry. Loans may now be made for prospecting and development work

* Presented to Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, Aug. 31, 1939.

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with the expectation of repayment from the earnings of the enterprise. It should now be possible for mining corporations to maintain a suitable reserve to tide over low earning periods and loss periods which so frequently accompany the vicissitudes of the mining business. The changes will not affect any considerable tax saving. How helpful the repeal of the undistributed profits tax provision will be, will depend somewhat on the attitude of the Treasury Department in enforcing the strengthened surtax provisions of the Act. It should be remembered that a penal surtax may be levied on corporations which accumulate profits or earning unreasonably in order to shield shareholders from high individual surtax rates. It may be that special scrutiny will be given to corporations retaining over 30 percent of their earnings. Instructions to Revenue Agents to that effect have just been issued. The Treasury Department need only find a corporation's accumulations of earnings to be unreasonable, and taxability under the surtax provision will be presumed. The punitive surtax is 25 percent of the first $100,000 of undistributed net income, and 35 percent of the balance, in addition to the income tax. The taxpayer must prove the reasonableness of his accumulation by clear preponderance of the evidence. Thus, if the Treasury Department should succeed in compelling the distribution of at least 70 percent of the earnings to stockholders, corporations earning more than $25,000 will pay a heavier tax under the new 18 percent rate than under the present corporate rates.

It may well be that the net result of the application of the 1939 Revenue Act to the mining industry will be an increase in the amount of taxes paid, an increase in the total amount received by the Treasury of the United States, accompanied with a removal of those objectionable features above pointed out which have made for inequalities and injustice in the application of the revenue producing measures.

Harmful Effects of Growing Tax Burden

It is that constantly growing burden of Federal taxation upon the mining industry which is harmful and discouraging. The effects on mining are more serious than on any other branch of industry.

The mining business more than any other needs venturesome investors. The hazard of loss in new ventures is so great that only those corporations and individuals who can afford large losses can furnish the necessary capital. Developments require large contributions of capital—far larger than can be supplied in ordinary avenues of investment. Even placer gold mining is now more successfully conducted by dredges costing from $250,000 to $500,000 and upwards. The pick and shovel belong to another era of mining—not to the present—not to the future. Low grade deposits of ores and minerals are the rule rather than the exception. These mean mass production, improved mining machinery, advanced metallurgy, enormous plant equipment, disproportionate permanent capital investment, high operating costs and narrow margins of final returns. The sources of minerals for the future are of course the properties now operating and extensions thereof, and new properties prospected or to be prospected and later developed. The means for extensions of present operations and the money for development of new sources must come from those desiring investments or from borrowed capital. If the property and operations cannot eventually pay the investor the return of his capital, and a fair return for the use of that capital while invested, the money will not be available. The credit requirements for borrowed capital are, of course, much more rigid.

Major Considerations Dictating Mine Investment Policy

As the major extensions in mining enterprises are for the most part made and paid for by those corporations and individuals already engaged in the business, the major considerations influencing the decisions to invest or not invest, advance or not advance, develop or not develop, are roughly the following:

First—Is the particular mining business a good one the country over; is it in a healthy and thriving condition?

Second—Can the operation return the investment and a profit; what is the risk of loss?

Third—And finally what will happen to the profit if it is received? Will so much be taken for taxes that the fear of loss exceeds the hope of reward?

The effect of Federal taxation in the answers to each of these questions is important.

Enumeration of Overheavy Tax Burdens

If the present burden of taxation is so great as to limit present operations in the business, it is not so healthy and thriving as to attract extensions or new ventures of the same kind. Let us examine that present burden.

A compilation prepared by Dunn & Bradstreet, Inc., shows that in the calendar year 1938, mines and quarries either as collectors for the tax authorities, or as actual contributors to the support of the Government, paid approximately $224,000,000 in taxes. Of each $100 of sales, $5.02 was paid in taxes. This is a higher rate than that paid by any other type of industry or trade in the United States. About one-third of this total tax amount is accounted for by social security taxes, one-third by the Federal income and excise taxes, and one-third by state and local levies.

Miners of metals and sulphur paid proportionately larger tax payments as the result of the combined influence of exceptionally heavy Federal income tax payments and payroll taxes, and higher than average state and local payments. It is true of some mining companies, at least, that of every $100 in sales $10-$12 is paid in taxes. One Idaho mine pays $1.25 in taxes for every $1.00 of payroll. In "Statistics of Income" on Federal taxes issued by the Treasury Department, returns of mining corporations for 1929, 1934, 1935 and 1936, by major industrial groups, show the amounts of income taxes and excess profits taxes paid the Federal Government for these years. It appears that in the year 1929, the year of maximum production and maximum profits for most mining companies in the recent history of the industry, the amount of income tax paid to the Federal Government by the mining and quarrying industry was $44,318,798. The figure dropped to $21,456,000 in 1934, with the addition of $428,000 for excess profits tax. In 1936, however, a year of relatively low production and small profits, the normal tax, the surtax on undistributed profits and the excess profits tax together aggregated $38,612,000, or a close approach to the amount paid in 1929.

An interesting compilation was made by the American Federation of Investors, Inc., of Chicago, demonstrating that for the fiscal year 1938 the taxes on American industry generally were more than double the amount paid in common dividends. The 163 companies analyzed may be

said to be truly representative of the larger industrial concerns of the United States, including mining companies, in practically every branch of the mining industry. The compilation shows that 61.6 percent of the net earnings before taxes were paid in taxes; that the 1938 taxes per common share of stock were $2.73; that the 1938 dividends per common share of stock were $1.33, less than half; that the amount of taxes paid per common stockholder was $283, and that the amount of taxes paid per employe was $576. While these figures include state and municipal as well as Federal taxes, it should be remembered that in the mining industry approximately one-third of the total tax is paid the Federal Government in income and excise taxes, and an additional one-third in social security taxes, making a total of two-thirds of the entire tax burden illustrated by the above figures. The enormous increase in 1937 and 1938 payments to the Federal Government results largely from the application of the Federal Unemployment Insurance payroll tax of 3 percent, and the Federal Old Age Benefit payroll tax one percent, plus an additional 1 percent on the employe for which the employer is the tax collecting agent. Where as in many, if not all, of the mining operations from 40 to 60 percent of the total cost is for labor, the payroll taxes alone take such a substantial percentage of the earnings as to diminish or completely extinguish the ultimate return to the investor or on his capital.

It may properly be said, therefore, that the present burden of Federal taxation discourages investment in the mining industry and retards its progress.

Any operating property requires earnings for the further development of that property. The amount of further development depends largely upon the amount of its earnings available for that purpose.

If five, ten or twelve dollars of every $100 received from sales and over 60 percent of the total net earnings must go for taxes, the extent to which the earnings may be applied to further development of existing properties and the opening up of new properties is curtailed just that much.

Extremely High Surtax Rate

There is an additional consideration to a large extent influencing investments for the development of the mining industry namely, the highly speculative nature of the investment and the accompanying risk of loss. Due to the nature of the deposits, particularly of the precious and non-ferrous metals, the grade and extent of the ore bodies cannot be forecasted with certainty, and a large percentage of investments in new properties is disappointing. The hope of larger margins of profits is the major justification for the assumption of the greater risks. Here the present individual and corporate income tax rates are of vital significance. Since 1913 the normal tax on individual income has increased from 1 percent to 4 percent. The surtaxes have increased from 6 percent to as high as 75 percent of the total net income. Assume that a man invests a million dollars in a rich gold mine. The property justifies expectation, and he is repaid his million dollars in the first year's operation. Of the million dollars the Government receives in income tax and surtax $681,000, leaving the investor $319,000. The investor will have to receive a million dollars for more than three years before he himself can realize his million dollar investment. Obviously the incentive for the risk vanishes and the investment is not made. The maximum surtax rate should be reduced to 10 percent or less.

Coupled with the concern of the industry over the burden of present taxes is the even greater anxiety as to future impositions.

When the income tax act was passed in 1913 the rate for corporations was 1 percent of all net income. In 1916 the rate was 2 percent. In 1917 the rate was 2 percent. In 1918, our war year, the rate was 12 percent of the income in excess of the credits. In 1919 and 1920 10 percent, and from 1921 to 1933 varying from 10-13¾ percent. Now in 1939, 20 years after the war, corporations earning in excess of $25,000 must pay 18 percent of the total net income to the Federal Government.

As an illustration of the application of present Federal taxes to the mining industry, I will refer to the 1938 figures for a small, but profitable, gold mining operation for the year 1938. I use this illustration because the price of gold has been artificially raised and controlled during the last few years of operation and gold mining stimulated thereby. Of the total expense of operating the mine, that is $290,213.64, Federal taxes constituted $45,602.81, or 15.72%. All taxes combined constituted $75,739.27, or 26%. Had the 1928 Federal tax schedules applied, the taxes would have been $26,757.75. The increase in the period of 10 years is 70.43%. For every ton of ore produced by this company, the company paid the Federal Government $2.29 in Federal taxes, $1.51 in state and county taxes, a total charge of $3.80. The Federal taxes were 54% of the entire salaries and wages paid.

The pyramiding of the tax burden follows the pyramiding of Federal Government expenses. Industries and individuals have had to reduce their expenditures in every line during the last decade to meet the depressed conditions and to survive, but at the same time ever mounting tax burdens, both state and Federal, have been imposed to meet the staggering expenditures of the Government.

The compilations in the duPont letter of May 24, 1939, show the following increase in the Federal Government expenditures since 1927:

1927	$3,494,000,000
1932	4,948,000,000
1939	9,592,000,000

Recent advices indicate that the total expenditures for 1939 authorized by the Congress will aggregate closer to eleven billions than the $9,592,000,000 indicated by the President's budget estimate used in the foregoing tabulation. Although 1932 marked the depth of the depression, possibly the year of greatest domestic need, the total annual expenditures for the fiscal year 1939, excluding interest and debt retirement, are more than double the 1932 record and over three times the 1927 figures. For the seven years from 1932 to 1939 the total Federal expenditures, excluding post office expenses, have amounted to more than fifty-three billion dollars, which is twice as much as the National Government spent from the time of its creation in 1789 to the end of the fiscal year 1916, a period of 127 years, and including all of our wars prior to the World War. This last rate of expenditure has taken place during the period when the average National income has been subnormal, during a decade, the only one in the history of the United States, when the average National income was less at the end of the decade than it was at the beginning.

Justification for these huge expenditures has commonly been expressed as providing relief, restoring employment and inducing recovery. The relief rolls are larger than ever; obviously unemployment problems are as serious as before; and recovery of business has not taken place on any permanent or satisfactory basis. There is little left to justify this orgy of

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spending but the headache and the debt. With an increase of some twenty-five billion dollars in the national debt since 1932, with unbelievable increase in the rate of current national expenditures, capital can have no confidence in going into new ventures and new enterprises that the investment may not be confiscated to pay the national tax burden. As the methods of Federal taxation are those of the pay roll and income taxes, a large portion of this debt burden must be discharged from the earnings of operating enterprises. Who can forecast the limits to which the Federal Government must go in appropriating those earnings to meet the debt and current public expenditures?

If price levels would rise to keep pace with added expenditures, some comfort might be taken. Thus the gold and silver properties have present controlled price conditions stimulating progress. But the others are without artificial price controls. The sales returns depend either on foreign market quotations or consumer demands at home. The pump-priming methods of stimulating business recovery raised prices for brief periods, but as soon as the priming was used up, the pump failed. So it will be again. For a while after 1932 there was hope that the large demands for Federal revenues might be only temporary to meet an admitted emergency. It now looks as if the tendency is to consider emergency a permanent condition.

The mining industry cannot afford to have its earnings taken by tax methods and distributed among farmers to bring about price parities for farm commodities, landowners to conserve their soils, power consumers to enjoy reduced rates, TVA's flood-control projects to furnish employment or control navigable streams, tenants to provide cheaper rents in cities, housing projects, Federal theaters, and the thousand and one other Federal activities comprising the enormous rat-hole into which the New Deal is so assiduously pounding the sand of industrial earnings.

On August 9, 1934, the Chief Executive said, "The processes we follow in seeking social justice do not, in adding to general prosperity, take from one and give to another. In this modern world, the spreading out of opportunity ought not to consist of robbing Peter to pay Paul." That, however, so far as the mining industry is concerned, is what is taking place.

The mining industry generally is not financially strong enough to bear that burden. The limit has been reached and passed. If we are to maintain present levels, if we are to advance, we must have a settled, assured policy of Federal taxation based on fairness, nondiscrimination and for revenue only, and coupled with that a rational program of Federal expenditures within the limits of the earners of the country to pay.

DISCUSSION

By LINCOLN G. KELLY

Certified Public Accountant
Salt Lake City, Utah

THE hour is late and I shall therefore take just two or three minutes to discuss one or two of the very important points raised in Mr. Hoover's paper.

He has given you a very informative, interesting and instructive paper, and certainly all of us thoroughly agree that the economic effect of the growing burden of taxation on the mining industry, as well as on all of the other industries, is particularly discouraging, and the main question to solve is: How can we overcome the bad effects and what remedies can be applied to again bring about an economic situation which will encourage the mining industry and induce people with capital to take the necessary chance involved in the investment of large sums required to develop the natural resources of the country?

It is regrettable that the inherent hardships and the venturesome nature of mining is not more thoroughly understood by the public, and particularly by taxing authorities. A more widespread knowledge of the fundamentals underlying successful mining operations, and the difficult situations that are generally encountered before success is attained, should result in public recognition of the need to encourage the development of new industries, including new ventures in mining.

More Encouragement Needed

It would be a step in the right direction, it seems to me, if we could get not only the Federal Government, but the state and local authorities to recognize this situation and to offer the encouragement that is given in some other countries, notably Canada, where, I understand, corporations undertaking new ventures in mining and the development of other natural resources are given an initial operating period of from three to five years free from the burden of any income taxes, the profits for this period being entirely exempt. I believe that if that policy were adopted in this country, it would tend very largely to increase the national income, and we might get close to the goal that the President has indicated as desirable—in the neighborhood of 100 billion dollars. Unless some steps in this direction are taken, if the burdensome taxes are continued with no ceiling on expenditures, then it becomes a question of how long the industries can survive—no one being willing to invest in new mining ventures. I think that if a favorable and encouraging attitude on the part of the public could be established, substantial amounts of capital, now idle, would be applied toward the development of natural resources, which would, by increasing the resources of the country, produce a good deal more revenue; and that revenue would bear its just portion of the taxes, and the Federal and local gov-

ernments would get more taxes to meet the government expenses and eventually bring about a balanced budget. Only chaos and disaster can result from a short-sighted policy with respect to taxes where the development of natural resources is involved.

Mr. Hoover has spoken of the advantages of a permanent taxing system. We have had some changes in recent tax laws which have been encouraging, but one of the most desired changes has not yet been recognized, and that relates to the treatment of capital gains and losses. While under the 1939 Revenue Act the limitation with respect to net losses has been eliminated, there can be no question in the minds of thinking people that the high and complicated tax on capital gains has retarded the velocity of business transactions. Capital gains and losses are still computed in accordance with the length of time held, and a portion of the gain is still included in ordinary net income subject to the normal and surtax rates. I think that capital gains and losses with respect to both individuals and corporations should again be segregated in separate schedules, taxed independently at a flat moderate rate without distinction between short term and long term holdings, and with a carry-over of capital net losses.

We have listened this morning to the counsel of the Treasury Department with respect to the trend of new taxation, and I think the mining industry can take encouragement from the fact that the trend seems to be toward a more equitable distribution of the tax burden and the development of a system of income taxation based on sound economic principles.

It should be emphasized that the mining industry is perfectly willing to bear and understands that it must bear its just burden of the taxes. It does not desire to shift its share of the burden to others, and it likewise desires that others be not permitted to shift their share of the burden to the mining industry. We should like to see a determined effort made to bring about a more equitable distribution, if possible.

Certainly, an effort should be made to reduce the national expenditures and to erect a ceiling above which they shall not be permitted to go, so that the revenues available will pay the expenses.

1939 Revenue Act Step in Right Direction

There has really been a forward step taken in the direction of sound taxation methods in the Revenue Act of 1939. It recognizes for the first time in a long period—at least since 1928—more clearly, the principle of raising revenue and the levying of taxes in accordance with accepted accounting methods and sound business principles, particularly with respect to the recognition and computation of gains and losses. The one important provision which is particularly commendable authorizes the carry-over of net losses for a period of two years.

I think the Mining Congress can take encouragement in the fact that many of its recommendations, together with the meritorious recommendations of other bodies such as the American Institute of Accountants, have been carefully considered by the Treasury Department, and many of those recommendations are now embodied and have become a part of our revenue law.

Reviewing the 1939 Revenue Act in comparison with the acts of the last 10 years, we recognize a trend in the right direction. As a result of considering meritorious recommendations of the American Mining Congress Executive Tax Committee, the American Institute of Accountants, and others, and then sponsoring the changes in the law embraced in such recommendations, the Treasury Department has done some exceptionally fine constructive work, and under its present personnel and leadership its present batting average is very high—the 1939 Revenue Act is far above the average of the revenue laws with respect to the recognition of sound business principles that have been enacted for a long period of time.

I might close with just a little story on these averages.

A gentleman from the West was traveling down South and was arranging to get off the train at Memphis. As the train approached the station the porter gave him rather special attention, and as he brushed down the trousers he found that the traveler had a few silver dollars in his pocket. This was the first time the traveler had traveled in the South, and he said to the porter, "Just what is the average tip they pay the porters down here in the South?"

The porter brushed him down again and kept touching those silver dollars, and then he said, "Well, boss, the average tip is just one silver dollar."

And so he went on brushing and touching the dollars again, and when the traveler alighted from the train he handed the porter a silver dollar. The porter looked at him and said, "My, that whole silver dollar ain't for me, is it, boss?"

The traveler said, "Why, yes. You told me the average tip down this way was a dollar."

"Yes," said the porter, "I done told you that, but you are the first traveler that I ever saw that really came up to the average."

Contract for Arizona Mines Building

Contract for the University of Arizona's new mining and metallurgy building, gift of the Phelps Dodge Corporation, was recently awarded by the university regents to the M. M. Sundt Construction Company, of Tucson. Cost of the building is to be $106,670, and will house all university instruction in mining and metallurgy. It is expected to be occupied by the opening of the second semester of the academic year, about February 1, 1940.

Harry Lavender, company vice president and general manager for Arizona, has announced the expenditure of $10,500 for furnishing the new building. Equipment costs will be in addition to those of construction and furnishing, and are yet to be estimated. A committee to study equipment needs will comprise Mr. Lavender, Dr. T. G. Chapman, head of the university's department of mining and metallurgy; L. M. Barker, mill superintendent for Phelps-Dodge at Ajo; W. P. Crawford, mining superintendent, Bisbee, Arizona, and A. C. Reifsnider, mechanical engineer, Bisbee.

Honoring James Douglas, pioneer Arizona mining man, the new building will bear his name at stipulation of the donor company. The structure is to be located on the north portion of the campus, north of the present mines and engineering building.

Mines on Marquette Iron Range Double Output

Production of five mines operating on the Marquette Iron Range in Michigan was to have been doubled starting September 12, according to an announcement by officials of the Cleveland-Cliffs Iron Company.

Cleveland-Cliffs operated its mines during the winter on a two-day basis, but last spring they were placed on a three-day schedule. Nearly all other mining companies had the same operating schedules. The mines which started on a five-day weekly basis are the Cliffs Shaft and Lloyd in Ishpeming, and the Negaunee, Maas, and Athens in the Negaunee district.

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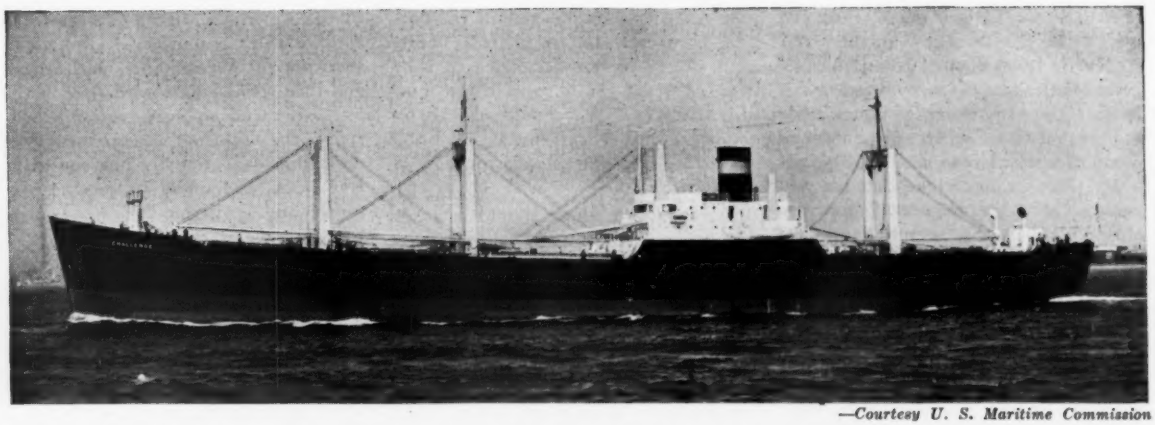
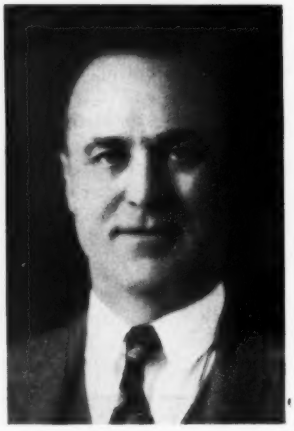


—*Courtesy U. S. Maritime Commission*

Typifying America's bid for a peerless merchant marine—the S.S. "Challenge," one of the U. S. Maritime Commission's C-2 type vessels which have proved their high fuel efficiency in recent tests

Experience Under the RECIPROCAL TRADE AGREEMENTS*



By HON. EDGAR B. BROSSARD
Member, United States Tariff Commission

THE trade agreements program, inaugurated by the Government June 12, 1934, was a distinct departure from the historical trade and tariff policy of the United States. It is still, after five years, so new and so little understood by many that it is opportune to present the facts about it whenever possible to interested groups of this kind.

There are, of course, wide differences of opinion as to the wisdom of this country's following such a policy at this time, and as to what if any *net benefits* the United States may gain from the trade agreements. Much has been said both for and against the new policy. These matters of policy, however, are outside of the limits of this discussion which is confined to a brief factual statement of experience under the Reciprocal Trade Agreements.

The Tariff Commission, as you know, is not a policy-determining body, nor is it an agency of any one political administration, but rather it is a bi-partisan research or fact-finding body. Consequently, this afternoon we shall discuss trade and tariff facts and omit arguments for and against trade and tariff policies.

First, we shall examine the need of the United States to engage in foreign trade and some of the barriers established by foreign countries that have made trade difficult and have resulted in the adoption of the trade agreements program by the United States. Then we shall describe how the trade agreements have been negotiated and indicate some of the specific changes made in the tariff rates, especially on metals.

Foreign Trade Essential in Times of Peace and War

The United States is rich in natural resources and is also a great mass-production industrial nation. Consequently we have surpluses of a great variety of commodities which we desire to sell abroad. To sell these surplus products abroad, we must buy other products and/or services from abroad. This makes foreign or international trade.

As for the need of our country to engage in foreign trade, there is no justifiable doubt. Foreign trade is both desirable and necessary to promote the maximum welfare of our people. Any attempt to limit our consumption to those kinds and quantities of materials produced within our own boundaries would, in time of both peace and war, impose needless hardship, and would compel a lowering of our American standard of living. Since the founding of our republic, foreign trade has been a vital factor in the welfare of our nation.

Great as are the resources of the United States, there are some goods which we lack but need for the better

* Digest of address presented to Sixth Annual Metal Mining Convention, American Mining Congress, Western Division, Salt Lake City, Utah, August 30, 1939.

functioning of our industrial system and some products the importation of additional quantities or special grades of which contributes to our high standard of living. We are fortunate in being able to both complement and supplement our own resources by purchases in the markets of the world.

It is possible, of course, to overemphasize the value to the United States of foreign trade. At the same time, there can be no doubt that exports and imports of many products are of substantial advantage to the national economy as a whole.

Were we to cut ourselves off from our foreign markets, we should be obliged to repattern our whole economic life, for many of our basic industries are geared to supply substantial fractions of their output to foreign buyers. Almost one-half of the South's raw cotton goes to the mills of Europe and Asia. Foreign outlets take almost one-third of the lubricating oil and one-eighth of the kerosene produced in the United States. One-third of the domestic production of borax goes abroad, and 45 percent of that of phosphate rock. About one-half of our production of prunes and of apricots goes overseas. Almost one-quarter of our office appliances, one-seventh of our industrial machinery, and more than one-quarter of our aircraft and parts go to foreign countries.

We could spend considerable time reciting similar facts about many other products of American farms, forests, mines, and factories, but there is no need for elaboration. Our splendid natural resources, our inventive genius, our mass-production methods, and our efficient workers have all contributed to create and to sustain a large foreign demand for American products.

On the other side of the picture we could ill afford to dispense with our imports. Our chief imports in 1938 were coffee, cane sugar, crude rubber, standard newsprint paper, raw silk, wood pulp, distilled liquors, tin, furs, unmanufactured tobacco, raw hides and skins, bananas, fish, burlap, diamonds, fertilizers, unmanufactured wool, cocoa, flaxseed, tea, industrial chemicals, art works, and coal-tar products.

Unfortunately, trade between countries is not as simple as it may appear at first glance. Trade, whether domestic or international, is *not* carried on in a vacuum. We cannot take refuge in the classic economic proviso "all things being equal." All things are not equal. Trade is complex. Competitive conditions involve many factors. Many imported products compete directly with like or similar domestic products, while many of the imports supplement rather than compete directly with domestic products. The same is true with our exports; some compete with and some dovetail into production in other countries.

Stevedore "hooking on" while unloading blister copper from "Santa Lucia"

—*Courtesy Grace Line*

Changes in International Commercial Policies Since the World War

We all know that during the postwar years the movement of goods in international trade has been further complicated by the use of more restrictive measures, such as higher tariffs, fees, quotas, licenses, exchange controls, and even embargoes. Currency depreciation also has been used both as an offensive and a defensive measure.

The new countries created after the World War by the Treaty of Versailles sought to protect their national economies by building up their own industries. Countries which prior to the war had been dependent to a greater or less degree on the older industrial nations took steps to protect the industries which they have developed during the war to supply their own needs. The older industrial nations in their turn sought to protect new industries and to restore the industries adversely affected by the unsettled conditions prevailing during and immediately after the conflict.

American Commercial Policy and the Trade Agreements Act

While these changes were taking place in foreign countries certain important developments had also occurred in the United States. After the upturn from the bottom of the depression, on June 12, 1934, this country adopted a policy of bargaining for the reduction of trade barriers by means of reciprocal trade agreements. The Trade Agreement Act empowered the President to reduce duties by not more than 50 percent of the existing rate in exchange for the lowering or removal of barriers of foreign countries against our exports, and provided for the incorporation of the unconditional most-favored-nation clause in all agreements negotiated under the act. In other words, all concessions granted by the United States to one country are generalized to like products of all foreign countries, except those countries found to discriminate against United States commerce. This latter provision is in accordance with the unconditional most-favored-nation policy first enunciated by Secretary of State Hughes in 1923 and later embodied in the Tariff Act of 1930. At present, the reduced rates are withheld only from Germany.

Now let us examine briefly the procedure followed in negotiating agreements under that act.

How Agreements Are Made

Before any trade agreement is negotiated a great amount of preliminary

work must be done by many agencies of the Government—the United States Tariff Commission, the Department of State, the Treasury Department, the Department of Agriculture, and the Department of Commerce. Each of these agencies has its prescribed sphere of operation, but their work is coordinated by a Committee on Trade Agreements. This body, which is composed of high-ranking officials of the various Government agencies mentioned, organizes and supervises the work of many subcommittees, directs the preparation of the necessary reports, reviews the recommendations of subcommittees, and formulates the draft of all trade agreements. These draft texts are then submitted, through the Secretary of State, to the President for his approval.

Negotiators Have All Essential Facts About Industries and Competition Before Agreements Are Made

Before entering into a trade agreement with any country, our Government not only assembles all of the pertinent information which its agencies have but, through public hearings, it further augments these data and—this is particularly important—it gives all interested persons an opportunity to present their views. They may present them publicly or privately, orally or in writing. In fact, a specially constituted body known as the Committee for Reciprocity Information is charged with acting as liaison between the public and the trade agreements organization. This committee is composed of officials of various Government departments, most of whom also serve on the Trade Agreements Committee. The Tariff Commission is represented on this committee.

From what has been said, it is clear that our Government has not hastily entered into trade agreements, nor has it made concessions on commodities without first getting all available information as to the probable consequences. Probably no other country in the world, in preparation for tariff action, goes to such pains to ascertain the facts and to such lengths to obtain the views of interested parties. Whatever mistakes may have been made were not from lack of information.

Trade Agreements Made With 20 Countries

Since June 12, 1934, the date the Trade Agreements Act became effective, our Government has negotiated agreements governing our commerce with 20 countries: Cuba, Belgium, Haiti, Sweden, Brazil, Canada, the Netherlands, Switzerland, Honduras, Colombia, Guatemala, France, Nicaragua, Finland, El Salvador, Costa Rica, Czechoslovakia, Ecuador, the United Kingdom (including British colonies and Newfoundland), and Turkey. The agreement with Czechoslovakia has ceased to be operative since that country was taken over by Germany, and that with Nicaragua has, by mutual agreement, been greatly modified. The agreements with the other countries, however, are in full force today. And our trade with these countries represents about 60 percent of our total trade with all of the countries in the world.

There are wide differences of opinion concerning whether, and if so the extent to which, the trade agreements have contributed to the expansion of our foreign trade, and what if any *net benefits* the United States has obtained from the agreements. These, however, are controversies no one can answer fully and conclusively at this time, and which we shall not here enter into because we want to use the time to point out some other facts about these agreements.

Only Third of Rates in Tariff Act of 1930 Reduced to Date

When the Trade Agreements Act became law, there were many who feared that it would be employed more or less indiscriminately to reduce the general level of our tariffs by the maximum extent permissible under the law; that is, by 50 percent. That, however, has not been done. Although many rates have been reduced the full 50 percent, others were reduced less than the full 50 percent, and twice as many as were changed, remain unchanged up to the present time.

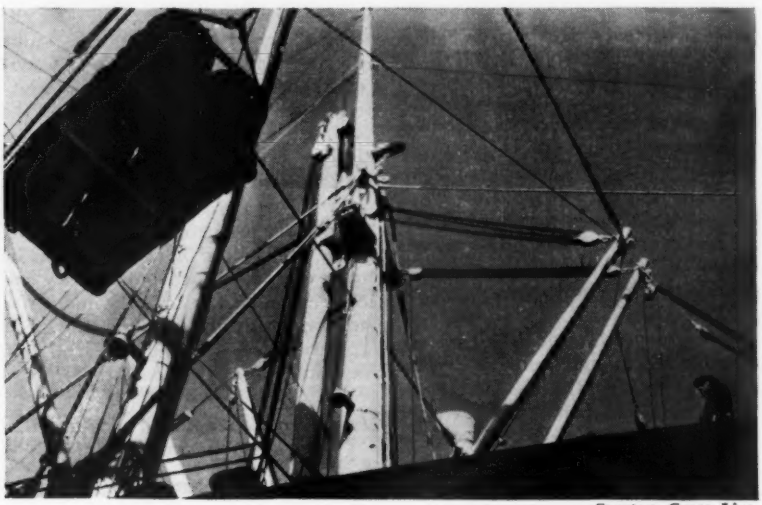
It is clear that while many concessions have been made in the trade agreements they have not whittled all our tariffs to the lowest possible levels which the law permits, as was at first feared would be done.

Reductions Made in Rates of Duty on Metals Other Than Iron and Steel

In the trade agreements thus far made, there have been about 9 or 10 reductions in rates of duty on metals other than iron and steel, of which the following are probably of most direct interest to you—manganese ore, lead pigments and zinc.

Manganese Ore.—Manganese ore is used predominantly to make alloys for the steel industry. Domestic production in 1929-38 has averaged about 33,000 tons, of which 10,000 tons is battery ore. Similarly imports have averaged about 470,000 tons yearly, of which only 4,000 is battery ore. Thus imports usually supply 95 percent of our total consumption, though only 30 percent of the battery or chemical grade. The principal foreign shippers to this market are Soviet Russia, the Gold Coast of Africa, Brazil, and India. There are no United States exports of record.

The rate of duty on manganese ore in the Tariff Act of 1930 is 1 cent per



—Courtesy Grace Line

Loading lubricating oil—an important product in our export trade

pound of manganese content. For the usual ores imported this amounts to about $11 a long ton. The Brazilian trade agreement effective January 1, 1936, cut this duty in half, and the benefit of the cut was extended to all the principal producing countries. The effect of the reduction in duty on the quantity of imports or on prices cannot be definitely traced, because the pickup in industry has been such as to dominate other factors. Domestic shipments as well as imports have increased since the cut in duty.

Lead.—Lead is used principally in storage batteries, pigments and cable covering, although around 40 percent of the annual tonnage consumed goes into a dozen or more minor uses. Our mines produce from 300,000 to 700,000 tons of lead yearly. For many years we have been on a slight import basis, mining about 5 percent less than our requirements for new lead; but during the last three years exports have been slightly in excess of imports. At all times most of the exports are with benefit of drawback or similar provisions. Usually about three-fourths of the imports are from Mexico.

The duty on lead in ore is 1½ cents and on pig lead 2⅛ cents per pound. No trade agreement has affected these rates. Reductions were made in the duties on lead pigments in the agreements with Belgium and the United Kingdom, but imports of pigments have been only about 3 percent of domestic production of pigments, whereas exports of lead pigments have been twice that quantity. Imports of pigments have been largely from the United Kingdom, Germany, and Austria, with Belgium a minor negligible source since 1934.

Zinc.—Zinc is used principally for galvanizing sheets and other forms of iron and steel, for making brass, and for zinc sheets and castings. Domestic output in the 1930's has generally ranged from 200,000 to 500,000 tons, the quantity depending on demand. Imports have ranged from 3,000 to 15,000 tons, largely as ore, except in 1937, when 37,000 tons came in. The principal source was Mexico through 1935, but beginning in 1936 appreciable tonnages have come from other sources, including Poland, Belgium, Norway, Canada, and the United Kingdom. Exports exceeded imports for many years, the excess dwindling from over 100,000 tons in 1925 to 4,000 in 1930 and to 1,000 tons in 1934. Beginning in 1935, exports have been less than imports, the excess of imports over exports averaging 6,000 tons per year except in 1937, when it was 33,000 tons.

The 1930 duty rate is 1.5 cents per pound on zinc in ore and 1.75 cents on zinc metal. The second trade agreement with Canada, effective January 1, 1939, reduced each of these rates by 20 percent, the reduction extending to all principal foreign suppliers except Germany. The domestic zinc industry has lost some of its exports and has complained that the reduction in duty has aggravated the serious condition of the industry by preventing a price recovery to more satisfactory levels. Imports of zinc in the first five months of 1939 were greater than in the entire year 1938.

I understand that the industry has recently taken the matter up with the Committee for Reciprocity Information to discuss the possibility of some relief by readjustment of the duty which was reduced in the trade agreement.

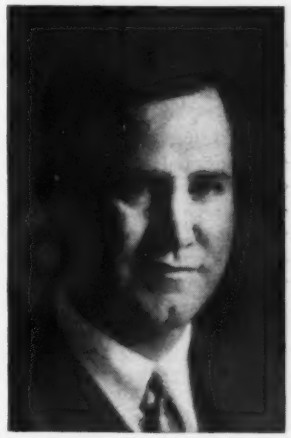
Conclusion

In conclusion it might be well for us to remember that in dealing with these economic questions like foreign trade, in which so many factors are involved, it is difficult if not impossible to isolate and measure precisely the effects of a specified change made in a tariff rate. It is more difficult still to forecast what the effects may be in the future.

Experience is the only real test, and with experience it is possible to show only the general results of the combined economic factors. It is rarely, if ever, possible to say that this certain change in the rate and this change alone has produced this specified result and no others on the competition and industries involved. Only in a general way is it possible to evaluate the results of specified tariff changes. That is one of the reasons why, in a republic like ours, the tariff is destined to continue indefinitely to be a public question needing careful consideration of all citizens.

Now what I have said here, of course, is in the light of history and what has been. Nobody can say what might be the results in the very near future if the world conditions are changed by the impending crisis.

DISCUSSION



By HOWARD HUSTON
American Cyanamid Co.

BEFORE I begin what I have to say, I want to make one thing clear—I want to make this a friendly criticism. Perhaps what I have to say will, of necessity, be regarded as criticism, but I do not want to indulge in recrimination. In spite of wanting to make my criticism friendly, I realize that I have certain prejudices and try as I will to eliminate them, they continue to remain with me. In spite of this I realize that there is no use for me to delude myself that I alone hold the truth nor in believing that anyone else alone knows the truth. Truth is the final thing that is going to come out of all of our efforts towards building it. We have all made mistakes these last several years. Business has made them. Labor has made them. Agriculture has made them. Government has made them.

Mr. Brossard has just given a very fine and very clear exposition of our experience under the reciprocal trade agreements. I congratulate him. I must, however, of necessity, look at it from a very different point of view.

I shall discuss it, first, from the viewpoint of a member of this democracy under which we live, and of which we are all members. Whether or not in that position we are for or against the fundamental policy contained in the reciprocal trade agreements is of some importance. For whether this policy is to be continued

indefinitely or whether it is to be abandoned, you may be sure will depend upon what the people as a whole want. Our Government and our country has become so complex that great movements in it come slowly. But surely the history of the past has proven that in the end the citizens will get the type of government and the particular policies under the Government which they have chosen and which they deserve.

Secondly, I shall look at it from the point of view of industry. Whether we be miners or manufacturers or distributors, we not only have the right—we have the duty to inquire as to what the net benefits to us have been under this policy.

When I arrive at this point I find myself stumbling. But of one thing I am sure. Something is wrong with our machine. No one who has lived in this country the past seven years can doubt that. As to what has caused the trouble there are many answers. As to how much can be assigned to one thing and how much to another you will receive a thousand different answers. In spite of all the efforts that have been made to clear up the situation, we are still groping in the fog. As regards the reciprocal trade agreements, I find many questions floating about in my mind. So perhaps the best contribution that I can make to you is to present publicly some of those questions which are bothering me and which may, perchance, be bothering you also. Let me, however, state at once that I do not necessarily expect to receive replies to them.

Let us admit at once that foreign trade is essential to the well-being of a modern nation. This is essentially true of the United States, as there are a number of commodities such as rubber, silk, coffee, tea, tin and nickel that this country does not produce. These products are necessary to our modern civilization. Therefore, we must buy them from other areas of the world.

Agree on Need of Reciprocity

In like manner, this country produces materials such as cotton, tobacco, automobiles, various minerals and many other farm and industrial products which are needed by others. We have capacity in men, land and plants to produce more of these commodities than we can consume. We must have foreign markets in which to sell these surpluses if our men, land and plants are to be employed. Therefore, foreign trade is essential to our prosperity. The larger the volume of foreign trade, both in imports and exports, the more prosperous we are. All of us, therefore, must be in favor of the general policy of reciprocity, if by that we mean the exchange of mutually beneficial tariff concessions between nations. I do not believe, however, that production and reciprocity are inconsistent. They should go hand in hand—the one seeking to secure the home market to domestic producers as far as they can reasonably supply the same; the other seeking, through mutually advantageous tariff concessions, to exchange our surpluses for articles which we need, together with the freedom of our market for the articles we do not produce.

Imports Increased Much More Than Exports

But has our present system of reciprocal trade agreements accomplished this end? Let us look first at exports. One of the basic purposes of the act was stated to be to stimulate exports—particularly of farm products. In order to bring this about it was argued that we must first permit some increase in the volume of imports. Comparing 1937 with 1934, the record shows that while imports "of dutiable commodities" increased 93.4 percent, exports increased in value only 56.9 percent. In other words, the net result was a tremendous increase in the value of imports compared with the increase of value of exports. But worse than this, when we break down the export items we find that the products of farms, forests and fisheries increased only 25.1 percent and the exports of many commodities, such as minerals and chemicals, increased clearly not because of reciprocal trade agreements but because of the foreign program of competitive militarization. My first question, therefore, is: *IS IT NOT PERFECTLY CLEAR THAT THE RESULTS EXPECTED UNDER RECIPROCAL TRADE AGREEMENTS DID NOT MATERIALIZE?*

Now let us look for a moment at imports. Up to last year the Administration had made 548 concessions. No rate of duty was increased, while 101 items were either bound on the free list or the present rate of duty bound. All of the others (447) represented reductions in the rate of duty. Now in order to analyze our imports we must consider separately the quantity of goods imported as distinct from the price. Of course, total value of imports is a combination of quantity times price. A careful study of both quantity and price of the 447 items on which rates of duty were reduced shows that the quantity of imports of these items increased 123 percent, while, on the contrary, prices of imported items on which the tariff had been reduced were 10 percent lower in 1937 than in 1936. In other words, during the time that the quantity of all imports increased 52 percent the quantity of the items on which the tariff was reduced increased 123 percent. On the other hand, while unit prices of all imports increased 20 percent, prices of items on which the tariff had been reduced decreased 10 percent. My second question, therefore, is: *IS IT NOT PERFECTLY CLEAR THAT THE RECIPROCAL TRADE AGREEMENT PROGRAMS HAVE NOT STIMULATED EXPORTS, LEAST OF ALL EXPORTS OF AGRICULTURAL PRODUCTS?*

Effect of Agreements in Lowering Prices

Closely linked to this is my third question: *IS IT NOT PERFECTLY CLEAR THAT THE TRADE AGREEMENT PROGRAM DID RESULT IN STIMULATING QUANTITY OF IMPORTS AND AT THE SAME TIME, DID IT NOT HAVE A VERY DEFINITE RESULT IN LOWERING PRICES, A POLICY DIRECTLY CONTRARY TO ALL OF THE OTHER GOVERNMENT SCHEMES TO RESTORE PRICES TO PRE-DEPRESSION LEVELS?*

Now to illustrate this trend let me take up a few concrete illustrations. For example, our exports of cotton have been reduced from about nine million bales to an average of less than six million bales a year. And our imports of fibres and textile products in the year 1937 exceeded our export. My fourth question: *HAS THIS PROGRAM WHICH WE ARE CONSIDERING DONE ANYTHING AT ALL TO HELP US REGAIN OUR FOREIGN MARKET FOR COTTON?*

Damage to Zinc Industry

Some of you people may remember that in the Canadian trade agreement the duty on zinc ore, zinc block, pigs, etc., was reduced in the last reciprocal trade agreement made with Canada. In the first five months of 1937, 734,927 pounds of zinc was imported into the United States. In the first five months of 1939, 6,132,299 pounds

of zinc was imported into the United States. The figures for the same periods for zinc blocks, pigs, etc., are 7,686,117 pounds and 22,678,343 pounds, respectively.

In reviewing only a few of the vital points in the Bureau of Mines' analysis of the reduction in the tariff on zinc, we find the following headings: "Domestic Industry Hurt," "Basic Position of United States Industry Jeopardized," "Our National Defense Threatened," "Curtailment and Shutdowns Have Occurred," "Imports Invade Domestic Market." Now, of course, you and I know that the total imports of zinc are relatively small. At least they are only a small percentage of the total amount of zinc produced and used in this country. But it is not necessary to bring in more than a few million pounds in order to upset the market. In fact, even the threat to import is enough to disrupt the American market. When the price goes down even three-tenths of a cent per pound on the zinc content of ore, it affects not merely the small quantity imported but the entire amount of zinc produced and used in the United States. My fifth question is, therefore: *HAS THE RECIPROCAL TRADE AGREEMENT PROGRAM HELPED THE ZINC INDUSTRY, AND HAS NOT THAT INDUSTRY SUFFERED A TREMENDOUS LOSS AS THE RESULT OF THIS AGREEMENT?*

I understand that negotiations are now under way to have this item changed. And the best that we can hope for is that clause 14 of the Reciprocal Trade Agreements Act, the clause known as the "escape clause," which has never been exercised, should be put into operation in this particular case.

I could extend these concrete illustrations to other items, such as mineral products, farm products and industrial products, if time permitted. Utah is one of the first four or five states in importance in the production of wool, and the imports of various woolen manufacturers and semi-manufacturers for the first five months of 1939 has shown a tremendous increase. The manufacturer of boots and shoes, the manufacturer of glass, the producers of tobacco and the producers of commodity after commodity will ask the same question: *HAVE THESE TRADE AGREEMENTS BROUGHT ABOUT GENUINE RECIPROCITY OF A KIND WHICH IS ACTUALLY HELPING THE UNITED STATES BACK TO PROSPERITY?*

Production Cost Differences

It is impossible in such a limited time to deal with all of the many ramifications of this important question, but there remain two or three items of a very general interest to which allusion should at least be made. The first of these concerns the constantly changing aspect of international markets. No period in history has seen the far-reaching geographical, economic, social and scientific changes that we have witnessed in the last 25 years. Along with this change has come a complete realignment of international markets. Italy and Germany have gained a great ascendency over Central Europe. Russia, in Asia, has a population in number about equal to that of North and South America. Japan, in the Far East, now controls most of the trade extending to 500,000,000 people. In 1929, the United States furnished Great Britain with 16.1 percent of its imports. In 1937 we furnished 11.1 percent, this change resulting largely from the preferential treatment which England gave the products of its colonies and dominions. Not only have these new alignments taken place, but a great many countries who formerly imported a great many industrial products now have developed their own industries and produce not only for themselves but for export as well. This places our domestic market, as well as our foreign trade, in direct competition with foreign manufacture. But we are a high cost producer because we pay high wages. Therefore, the question inevitably arises: *DOES THE PRESENT POLICY FULLY TAKE ACCOUNT OF THE DIFFERENCE IN PRODUCTION COSTS OF AMERICAN AND FOREIGN PRODUCERS, INCLUDING WAGE SCALES AND OTHER COST FACTORS, AND DOES IT PLACE AMERICA IN A POSITION TO MEET THIS FOREIGN COMPETITION?*

Another very important general subject is the question of exchange and exchange controls. A large number of countries of the world today dictate how their exchange shall be used. The control of foreign exchange is a much more effective trade barrier than the tariff. Goods can come in over a tariff, but if a country with an exchange control system refuses to sell foreign exchange to its citizens to buy a certain commodity, this product cannot enter the country even if it is on the free list. *HAS THE UNITED STATES IN ANY OF THE TRADE AGREEMENTS WHICH IT HAS ENTERED INTO PROTECTED THE CITIZENS OF THIS COUNTRY FROM EXCHANGE CONTROL MANIPULATION?*

Effect on Labor

Finally, I want to raise a question about the employment of labor and the consumption of our farm products. The United States is by far the greatest and richest market in the world. This market is increased or decreased according to the ability of the citizens of the United States to purchase. When our labor is fully employed the market for farm, mineral and industrial products necessarily increases. In this connection the tariff has as direct an influence on the employment of American labor as does the immigration laws. In the one case we import men to take the jobs of those employed. In the other, we import goods which in many cases could be produced by the men already employed. *DOES IT NOT, THEREFORE, STAND TO REASON THAT IF FOREIGN PRODUCTS ARE PERMITTED TO BE SOLD IN OUR MARKET BELOW OUR COSTS, IT CANNOT DO OTHER THAN CREATE IDLENESS AMONG OUR WORKERS AND PREVENT THE REEMPLOYMENT OF THOSE PRESENTLY UNEMPLOYED?*

Some time ago Mr. Guy Dyer, of Vanderbilt University, told of a farmer who invited his neighbors to a "barn raising." On this particular occasion one of the workers fell quite a distance from a structure and seemed to be badly injured. They had to send miles away to get a doctor and hours passed before the doctor arrived. There was a negro quack among the workers, and the whites decided to let this negro do what he could to relieve the injured man. When the doctor arrived he asked the negro quack what he had done for the man. "I give him some alum and glue," said the negro.

"Why in blazes did you do that?" asked the doctor.

"I decided he must be all broke up on the inside," said the negro, "and I give him the alum to draw the broken parts together and the glue to stick 'em and hold 'em together."

After more than six years of numerous costly experiments under what I might designate as the "alum and glue theory" of economic recovery, do we not find the once great and invincible industrial organization of this country so "drawed up" and "stuck up" that it is impossible for it to function in an efficient way?

The Development of Automatic Coupling for Mine Haulage

By E. LARSSON
Coupler Engineer
Ohio Brass Company

THE increased use of coal, minerals and other mining products in our generation has brought about a condition where mine haulage has developed into a real transportation problem somewhat similar to the problem faced by the American railroads in 1884 when the Master Car Builders Association of the American Railroad Association recommended automatic couplers of the Janney type to be installed on all railroad cars built after that date.

Up to that time most railroad freight cars had been equipped with a link and pin type of coupling similar to that which is still used on most mine haulage equipment today. The great danger to trainmen in coupling cars and the long time required to make up trains led to constant discussion of the subject of automatic coupling of railroad cars.

In the mining industry today the vast improvements in mechanical power-driven mining and loading equipment have increased the speed of production in mines to such an extent that, in order to transport the mining products out of the mines larger cars and locomotives, longer trips and higher speeds are now used in mine haulage than were thought possible a few years ago.

Haulage Speedup Raised Automatic Coupling Need

This development has brought about a realization, among mining officials and operating engineers, of the necessity of adopting automatic couplings for mine haulage equipment so as to eliminate the hazard and loss of time involved when using the present link and pin couplings on heavy equipment.

The need for an automatic coupling, particularly adapted for mine car operation, was brought to the attention of the Ohio Brass Company by operating mining engineers. This company was chosen because of the reputation it has built up during the past 40 years as a reliable manufacturer of automatic couplers for electric and steam railroads.

Understanding the need for an automatic coupling for mine car operation, the problem was studied for a number of years. It was quite natural in the early stages of development to attempt to modify railway couplers for mine service. It was finally realized, however, that mine haulage was so much different from railroad operation that a satisfactory mine car coupler could not be secured by a simple modification in size or design of any existing type of railroad coupler.

Advantages of Automatic Coupler

A number of reasons can be pointed out, and have been substantiated in actual installations, why an automatic coupler of this type should replace the link and pin type of coupling on future mining equipment.

Removal of the possibility of serious injury to the men performing the duty of coupling and uncoupling is important both from humanitarian and economic points of view.

With automatic couplers, handling of trips is materially speeded up at loading, gathering and unloading points.

The fact that all slack and backlash are taken out of the trips with this type of coupler eliminates a lot of shock and strain from motors and cars, and this results in considerable saving in maintenance expense. This also eliminates most of the present trouble with coal being shaken off from heaped cars in transit.

In case of collision, caused by a runaway car or trip, the couplers will automatically couple with little or no damage done and when cars are accidentally derailed, the rigid beam connection formed between cars by the automatic couplers will prevent telescoping and piling of cars on top of each other.

Coupling Action Described

The mine-car coupler eventually developed for the mining field is of the "camlock" type. Inasmuch as it is designed especially for mine haulage where cars are not turned end for end, a "male" type coupler is mounted on one end of the car and a "female" on the other.

The female coupler head is a box-shaped steel casting with a heavy, flat face for buffing. The male coupler head is provided with a similarly shaped buffing face, from which a heavy nose extends. This extension enters and closely fits the inside of the female head when the couplers are in coupled relation (see Fig. 1).

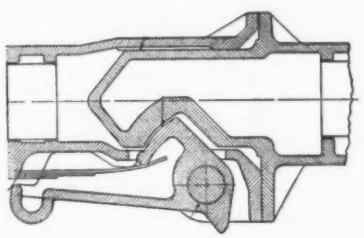


Fig. 1. Automatic couplers in coupled relation, showing positive interlocking feature

The female coupler is provided with a spring-actuated cam which engages with a corresponding cam seat in the top side of the extension of the male coupler when the couplers are coupled.

The cam seat in the male coupler is "undercut" on the lower side and the face of the cam in the female coupler is high on the lower side, so that a positive interlock is provided against

any possibility of the couplers coming uncoupled under pull.

The cam in the female coupler head is brought into coupled engagement with the male coupler by gravity and by the tension of the cam spring when the couplers are bumped together. The cam spring, in addition to giving the cam a snappy action at coupling, also serves to keep the cam in coupled relation when the cars are rolled over in a rotary dump.

The extension from the face of the male coupler, in addition to being the coupling member engaging with the cam in the female coupler, also serves to align the couplers at coupling and guide them into coupled relation. The size and shape of this extension and the size and shape of the female coupler head are such as to align the couplers to couple automatically without manual alignment on straight track and curves with a minimum radius of 22 feet when the couplers are installed on mine cars up to 5- or 6-ton capacity (Fig. 2).

The coupler heads are provided with vertical "pick-up" or aligning features to allow for automatic coupling of cars with a difference in coupler heights of up to 3 inches. This is sufficient to take care of the breaks in grade and normally uneven track conditions existing in mines.

The above lateral and vertical aligning features have been worked out for what might be considered medium-sized cars and normal track conditions. If couplers are required for larger cars and different curve and

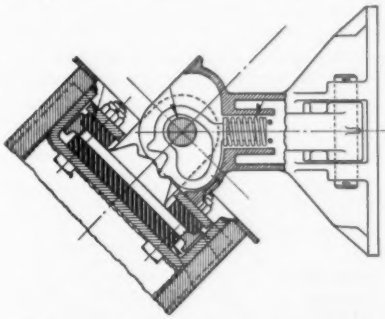


Fig. 3. Mounting the rubber-mounted coupler on a typical car. The automatic centering device is self-contained within the coupler shank

grade conditions, couplers of the same type can be designed to couple automatically under any practically applicable curve and grade condition simply by changing the size and shape of the coupler heads.

In order to permit the aligning means on the coupler heads to function and provide for automatic coupling without manual assistance under all conditions, the coupler is provided with a centering device and spring support that keeps it in horizontal position in the center of the car when the coupler is uncoupled, but allows the coupler to move laterally and vertically with the curvature of the track when coupled.

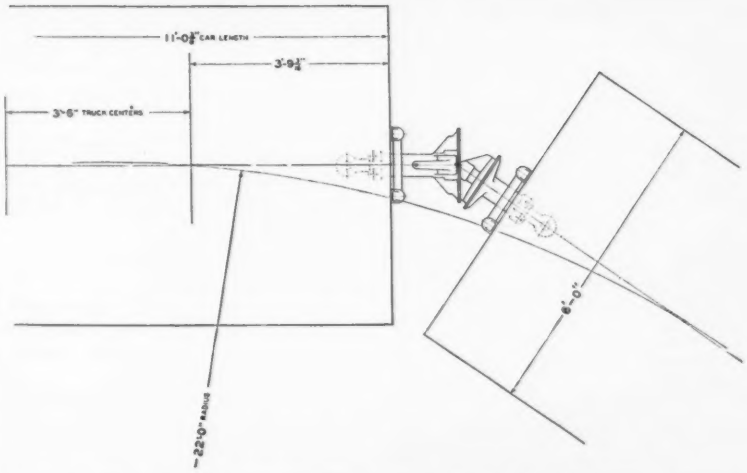


Fig. 2. Couplers will couple automatically on curves of 22 ft. radius and on vertical curves of ordinary radii

In the early designs of this type of coupler, the centering and supporting means were incorporated in a separate device which was mounted on the end of the car, but in a later, improved design of the coupler the centering device is built into the coupler shank and the supporting springs have been incorporated in the coupler attachment to the car (Fig. 3). This results in a more economical construction and also provides for complete protection of the centering and supporting parts.

A spring draft gear was originally used with this coupler, but in the later, improved design rubber cushion blocks are used for absorbing the buffing and pulling shocks instead of steel springs. By using rubber for this purpose instead of springs, more shock-absorbing capacity can be built into the same space, so that, with this type of buffing arrangement, the "load space" taken up by the coupler attachment is reduced to a minimum.

Another advantage of rubber in a mine car buffer is that rubber stands up well and lasts longer compared with steel springs under the moist air and acid water conditions common in most mines.

In order to provide means for dumping of cars in a rotary dump without uncoupling, the male coupler head is rotatable around the shank of the tail piece.

Fig. 4. Automatic coupling eliminates the customary hazards of manual coupling

An uncoupling rod, mounted across the female coupler end of the car, having the ends bent down to form a handhold close to each side of the car and attached to the coupler cam at the center of the car, provides means for safe uncoupling of the couplers without the necessity of the operators going between the cars.

The one hundredth anniversary of the discovery of iron ore in the upper peninsula of Michigan will be celebrated in Negaunee during the summer of 1944, with one of the biggest celebrations ever held in the upper peninsula being planned by Negaunee officials five years in advance.

Discovery of iron ore was made within the city limits of Negaunee in 1844, near the present site of the Jackson mine. Both the cities of Negaunee and Ishpeming, located about 3 miles apart, owe their development to the iron-ore discovery.

Living and Working Conditions In the Tri-State Mining District

By EVAN JUST

Tri-State Zinc & Lead Ore Producers Association

Introduction

ON OCTOBER 8, Walter Winchell announced over the radio that before long the National Committee for People's Rights would release a scandalous exposé of living and working conditions in the Tri-State Mining District of Oklahoma, Kansas and Missouri.

As far as we can discover, the National Committee for People's Rights is principally a group of well-meaning New York liberals who have been sufficiently gullible to consider endorsing distorted stories of the history and conditions in our area, and may be ununwittingly lending assistance to parties whose basic purpose is sabotage of private industry.

The present publicity lends itself to a "smear" campaign that has been fostered for more than a year. Obviously there is an intention to dramatize, exaggerate and publicize certain local conditions in the hope of creating a national scandal similar to the extravagant furor raised over the Gauley Bridge tunnel a few years ago. Apparently the promoters of this publicity did not know that the U. S. Public Health Service has been studying dust disease and living conditions in this district since 1915 and that the Picher Clinic, which operated from 1924 to 1932 under the joint auspices of the U. S. Public Health Service, the U. S. Bureau of Mines and our Association, conducted one of the most exhaustive investigations of silicosis ever made.

Apparently having discovered that our mining operations today practice dust control to such an extent that propaganda based on negligence of employers would quickly fall flat, the present intention seems to be to dramatize surface dust living conditions in the hope that by implication the blame can be caused to fall on the mine operators.

What Is Silicosis?

Silicosis is produced by breathing high concentrations of fine silica (SiO_2) dust over a period of many years. The effect is not one of abrasion or cutting, as the uninformed commonly assume, but a chemical effect which causes nodules of nonfunctional tissue to form in the lungs. Pure silicosis is scarcely a disabling disease, as it produces no pain or discomfort, but in advanced cases simply some shortness of breath when arduous tasks are performed. Except in very advanced cases it cannot be reliably diagnosed, even by a physician, without good X-ray pictures of the chest. Deaths from silicosis are almost unique in medical history.

The circumstances that makes silicosis a matter of public concern is its tendency to create susceptibility to tuberculosis, which is caused by infection with the bacillus tuberculosis. Where and how a person may become infected with tuberculosis is largely a problem of his private life. The portion of tuberculars employed in the mines is less than 1 percent of payrolls so the danger of infection is much less at work than elsewhere. The incidence of silico-tuberculosis in local communities is high, but represents a hangover from a past period when mine dust was uncontrolled, when both operators and men were unaware of the dangers attending dustiness in the working places, when tuberculars were numerous on payrolls, and when few personal precautions were taken to avoid exposures that invited pulmonary disorders.

Thorough wetting of muck is an essential practice in underground dust control, and is in general use throughout the district

Dust Control in Mines

Our rock material contains a high percentage of silica. As the culmination of investigations, publications, and education which began in 1915 on the part of the U. S. Public Health Service and the U. S. Bureau of Mines with the cooperation of mine operators, our mines today are safe places

to work. By wetting down, by water sprays, and by ventilation, the dust is kept within limits recognized as safe by medical authorities. In those few spots where the means of preventing dustiness have not yet been devised, respirators are used. At frequent intervals an air hygiene engineer employed by our Association analyzes dust and air conditions in all the working places of our members, and submits reports calling sharp attention to any undesirable conditions. An intelligent and fair analysis of the extensive research which has been carried out in this District and of the good results obtained by honest efforts to control dust would excite public approval of our mine operators as a group, rather than the invective which irresponsible agents of subversive groups seek to heap upon them.

Local Living Conditions

Undeniably a condition exists in parts of the Picher mining field entirely comparable to the slums of a large city. Squalor and ignorance can be found, and present as hopeless a problem as do slums anywhere. The bulk of these unfortunates are not connected with the mining industry and are simply the remnant and offspring of a host of derelicts who moved into the District during boom days many years ago. Most of these people will make no serious effort to cooperate toward improving their lot, and present a social problem which exists in hundreds of communities over the country and for the present seems unsolvable.

In addition to these people unconnected with the mining industry, a minority of the miners live in small unattractive shacks. This mode of life is a matter of individual choice, as even in hard times wages do not go below 40 cents per hour and are substantially greater when ore prices are high. The homes of the majority of the miners are clean and attractive and are scattered over a 50-mile belt, from Carterville, Mo., to Miami, Okla. The mine operators have never undertaken to dictate how and where their employes should live. In most cases the employers do not own the land where they are mining, but simply lease underground rights. Thus, they cannot even regulate living conditions above their workings. In Oklahoma the bulk of the unattractive dwellings are on Quapaw Indian land, under Government management.

Several towns in the mining field, such as Picher, Cardin, Hockerville, Douthat, and Treece are surrounded by large dumps of crushed waste rock from the mines, locally known as "chat piles." Although these dumps are numerous and picturesque, and are commonly dramatized by propagandists as the source of clouds of withering dust, actually they contribute almost no dust to the atmosphere, as they are composed principally of coarse material. The only noteworthy dust from industrial waste comes from flat accumulations of sands and slimes which are relatively few in number. On windy days, if this material is dry and exposed, considerable dust is produced. Again the dramatic possibilities outstrip the facts, as a large part of this dust is too coarse to be drawn into the deep lungs and produce silicosis. Even if it were sufficiently fine to do so, there are not enough windy days in a year to produce silicosis from this source.

Unquestionably day in and day out, year in and year out, the greatest source of surface dust is the roads, as most of the side roads are gravelled with chats, and every passing vehicle causes sufficient abrasion to produce dust. Road dust composes fully three-fourths of all the surface dust, but even this is insufficient to produce silicosis. Competent physicians have repeatedly examined groups of people who have been exposed to local surface dust for years but have found no pathological evidence of dangerous conditions from this cause. As a matter of fact, there are no cases in medical annals where surface dust conditions have produced silicosis.

Dust counting in a Tri-State mine. The U. S. Bureau of Mines Midget Impinger is used with a permissible limit of 5,000,000 particles per cubic foot

Air-water mist spray operated in conjunction with scraper loader to eliminate dustiness. Scrapers produce dust even where muck is already saturated, and this additional precaution is usually necessary

1. Lanza, A. J., and Higgins, Edw., "Pulmonary Disease Among Miners in the Joplin District, Missouri, and its Relation to Rock Dust in Mines." U. S. Bur. of Mines, Tech. Paper No. 105, 1915.

2. Higgins, Lanza, et al., "Siliceous Dust in Relation to Pulmonary Disease Among Miners in the Joplin District, Missouri." U. S. Bur. of Mines Bull. No. 132, 1917.

3. Sayers, R. R., "Silicosis Among Miners." U. S. Bur. of Mines Tech. Paper No. 372, 1925.

4. Sayers, R. R., Meriwether, F. V., Lanza, A. J. and Adams, W. W., "Silicosis and Tuberculosis Among Miners of the Tri-State District of Oklahoma, Kansas and Missouri." Tech. Paper No. 545, Bur. of Mines, 1933.

5. Meriwether, I. V., Sayers, R. R., and Lanza, A. J., "Silicosis and Tuberculosis Among Miners of the Tri-State District of Oklahoma, Kansas and Missouri." Tech. Paper No. 552, Bur. of Mines, 1933.

6. The Medical Committee of Air Hygiene Foundation of America, Inc., "Silicosis and Allied Disorders History and Industrial Importance." Medical Series Bull. No. 1, p. 112, 1937.

7. Dills, Chas. C. and Nichols, A. L., "Preliminary Industrial Hygiene Survey of the Kansas Zinc and Lead Mines," Kansas State Board of Health, Investigation Report No. 1, 1937.

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

THE 44-day Special Neutrality Session, begun September 21, came to an end on the 3rd of November with the adjournment of the Senate and House at approximately 6.30 p. m. Throughout the session sentiment in both Houses of Congress had been turning in favor of the type of neutrality measure which was finally passed and sent to the President for approval. In effect it is a cash and carry measure, and its approval by the Congress at an earlier date than expected by many has been cited by Administration supporters as proof that Administration forces are in the ascendency throughout the country. A great many observers deny this and say that while many of the divergent elements in the Congress joined in passage of the Neutrality Bill, when the Congress reconvenes in January the controversial situation which marked the closing of the previous session will be resumed and that anti-Administration movements will again be much in evidence.

Taxation

Most important factor in the current tax picture is the Ways and Means Tax Subcommittee and its proposed studies of the Revenue laws in preparation for the possible Revenue Bill of 1940. Rumors have been heard recently that in view of the coming election year the tax studies may not be carried out by the Subcommittee. However, it is known that Undersecretary of the Treasury John Hanes is desirous that the work shall continue as planned, and that progress initiated in the Revenue Act of 1939 in removing tax deterrents to business shall go forward.

The present personnel of the Ways and Means Tax Subcommittee is made up of Representatives Jere Cooper, Tennessee, Chairman; John W. McCormack, Massachusetts; Wesley E. Disney, Oklahoma; Frank H. Buck, California; Richard M. Duncan, Missouri; John W. Boehne, Indiana (democrats); and Allen T. Treadway, Massachusetts; Frank Crowther, New York; Daniel A. Reed, New York, and Roy O. Woodruff, Michigan (republicans).

In the meantime a great many individuals and representatives of associations have responded to the invitation of Mr. Hanes to present their recommendations for changes in the Revenue Laws to the Treasury, and Hanes and Legislative Counsel Thomas Tarleau have been engaged in these conferences for many weeks.

Monopoly

After concluding testimony of oil industry witnesses presented by the Department of Justice, the Temporary National Economic Committee, under the Chairmanship of Senator Joseph C. O'Mahoney of Wyoming, began a similar inquiry into the steel industry on November 1. Assistant Attorney General Thurman Arnold, in charge of the Anti-Trust Division of the Department of Justice, explained in opening the hearings that while no "attitude for or against the industry" will be taken during the hearing, certain judgments and recommendations will be presented within the next few months.

The first witnesses to appear were a group of iron ore producers from the Lake Superior region, embodying operations in Minnesota, Michigan and Wisconsin. Those testifying were Elton Hoyt, II, Pickands, Mather & Company; E. B. Greene, president, Cleveland-Cliffs Iron Company; Crispin Oglebay, president, Oglebay, Norton & Company; George M. Humphrey, president, M. A. Hanna Company, and Emmett Butler and Patrick Butler of Butler Brothers. The hearing continued for three days, and was directed chiefly by Department of Justice lawyers to prices of iron ore and practices in the sale of ore to the steel company consumers. The testimony further developed that in years of low production the taxes paid by the ore companies had in recent years amounted to as much as $7 per ton of ore produced, and that operators had also faced seemingly insurmountable problems in meeting heavy minimum royalty payments on their iron ore leases and in securing money to meet payrolls in order that the mining population might carry on under the conditions of greatly reduced working time.

Foreign Trade Agreements

Approach of the closing date for filing briefs by persons concerned with the production of commodities named as subject to negotiation in the proposed Chilean Foreign Trade Agreement has aroused intense feeling in many of the copper producing districts. The closing date for briefs is November 11, and the date set for oral presentations is November 27.

On October 31 a storm which had been brewing since the oral hearing earlier in the month on the proposed Argentine Foreign Trade Agreement burst forth on the floor of the United States Senate. Senator Vandenberg, representing the hard-pressed Michigan copper producers, protested that the State Department is exceeding its lawful authority in attempting jurisdiction over the copper excise tax. He quoted from the statement in debate on the foreign trade agreements legislation on June 4, 1934, when Senate Finance Committee Chairman Pat Harrison said:

> "With reference to excise duties, * * * it was the intention of those who framed the legislation and of the House in passing the bill that they (excise taxes) would be frozen; in other words, they might not be modified."

Again:

> "The four items concerned were lumber, coal, oil and copper. So to remove any doubt as to what the intention was, I have an amendment to offer which will clarify the matter; and if the amendment shall be adopted, it will free those four items. In other words, the duty cannot be increased and the duty cannot be lowered."

Again, the Senator from Mississippi (Mr. Harrison) speaking:

"All excise taxes are frozen in this bill. We do not propose to disturb excise taxes at all."

Senator Vandenburg was supported in his position by Senators Carl Hayden of Arizona; Dennis Chavez, New Mexico; Charles L. McNary, Oregon; William H. King, Utah; William E. Borah, Idaho; Joseph C. O'Mahoney, Wyoming; Pat McCarran, Nevada; Key Pittman, Nevada; Alva B. Adams, Colorado, and Rush D. Holt, West Virginia.

Senator Adams, in criticizing the methods used under the State Department in the negotiations of foreign trade agreements, asserted:

"Mr. President, the Senator is speaking of the undesirability of the Committee meeting in secrecy. I went down to an open meeting the other day. Fifty other Senators and members of the other House attended the meeting of that Committee (the Committee for Reciprocity Information hearing the Argentine agreement arguments), all of whose authority came from the Congress of the United States. Fifty Senators and members of the other House go down, hat in hand, asking this Committee, 'Please do not do this to my State.' So we have the spectacle of representatives of sovereign States in the open begging the creatures of Congress to be good to those whom the Congress represents."

Said Senator Holt:

"I agree with the Senator. I think that shows how Congress has abdicated its powers, and I believe that trade agreements should be submitted to the United States Senate, where the power lies for their ratification or rejection."

The members of the House and Senate are well acquainted with the experience of the zinc industry in its loss of 20 percent of the duty, amounting to $7 per ton of metal, under the Canadian Foreign Trade Agreement effective January 1, 1939. Since that date the countries which have benefited by the cuts in the zinc duty are not Canada, but Belgium, Mexico and others. Farmers, stock growers and wool growers have been harmed by foreign trade agreements or by the threat of their negotiation, and there is unquestionably a strong sentiment on Capitol Hill which may easily result in the refusal on the part of Congress to renew the authority for the making of foreign trade agreements which expires in June, 1940.

National Labor Relations Act

The House Committee under the chairmanship of Howard W. Smith, of Virginia, is carrying on its investigations of the National Labor Relations Board under the able direction of its General Counsel, Edmund M. Toland. For a comprehensive investigation such as Mr. Toland is capable of conducting, the appropriation of $50,000 for the entire work of the Committee is pitifully meager. Many have expressed the desire to increase this appropriation, and it is possible that the House will provide additional funds.

The 60,000 inquiries originally mailed out by the Committee to employers and trade union groups have been further supplemented by questionnaires mailed to the police chiefs of over 6,200 towns and cities asking: (1) if any requests were made upon peace officers for police protection, and by whom, during any labor dispute; (2) whether Board representatives participated in disputes leading to such requests; (3) whether lawlessness in the community has been increased or decreased since enactment of the Act; (4) whether employes have been coerced or threatened for failure to join any labor organization; (5) if Board agents interfered with police operations; (6) if force was necessary to quell disturbances during the dispute, and (7) whether any of the disputes requiring police protection were created by Board activity.

Witnesses for mineral producers who appeared before the Senate Committee on Education and Labor through arrangement made by the American Mining Congress are submitting the material which they presented at that time, with some additional revisions, to the House Investigating Committee, and it is anticipated that Committee hearings will begin during the latter part of January.

Wage-Hour

In the middle of October Colonel Philip Fleming of the Army Engineer Corps who has served in executive capacity with the PWA, the Passamaquoddy Project in Maine and the Resettlement Administration, was placed in charge of the Wage-Hour Division, Department of Labor. Simultaneously with the departure of Elmer F. Andrews, his deputy administrator, Paul Sifton, resigned. Both men were originally brought from the New York State Department of Labor by Secretary of Labor Perkins.

In connection with the 42-hour week made effective by the Wage-Hour Act after midnight October 23, General Counsel George A. McNulty of the Wage-Hour Division issued an opinion stating that the 42-hour week applies to the first full workweek beginning on or after midnight of October 23. In illustration he said:

"Thus if the employe's workweek begins on Monday, October 23, the employer need pay time and a half only if more than 44 hours are worked in the period of seven consecutive days from Monday, October 23, through Sunday, October 29, inclusive. The employe in such case did not work 'for a workweek longer than 42 hours during the second year from such date' (October 24, 1939). Beginning Monday, October 30, such employer must pay time and a half after 42 hours are worked in a workweek. Of course, if the employe's workweek begins on or after midnight October 23, the employer must pay time and a half after 42 hours are worked in the workweek beginning at such time."

Meanwhile the Research and Economic Section, Wage-Hour Division, is carrying on with its plan for a survey of the effect of the Wage-Hour Act on the mining industry of the West. It is expected that in the near future, as a first step in the survey, a simple questionnaire will be mailed to the mineral producers of the Rocky Mountain West, and that a considerable amount of supplementary field work by representatives of the Research and Economic Section will be made in the winter months.

It is now expected that the Exemptions Section, Wage-Hour Division, will soon issue a decision on the petition of the American Mining Congress in behalf of the Alaska Placer Miners Association, the Oregon Mining Association and the placer operators of other states for the 14 weeks seasonal exemption for which provision is made in Section 7 (c) of the Wage-Hour Act. If the decision is favorable it will permit placer mining operation in Alaska and in the states named in the decision to operate a 56-hour workweek during a total of 14 weeks in any one year.

Bituminous Coal

A hint of coming resistance to the attempt of the Federal Government to fix prices for coal under the Guffey Act is evidenced in the action of the city of Atlanta, Ga., in taking an appeal to the Supreme Court of the United States in which the Court is asked to rule ". . . the National Bituminous Coal Act of 1937 is contrary to the Constitution of the United States; that the National Bituminous Coal Commission is without authority to promulgate minimum price orders; and, that if said Bituminous Coal Commission shall issue minimum price orders, that said orders are not applicable to appellant or any coal purchased by it." The Georgians argue that the price provisions of the Act violate the due process clause of the Constitution, are contrary to the public interests and benefit only a particular class, do not promote interstate commerce and remove burdens or obstructions to that commerce or pre-

vent unfair competition, and that they further constitute an unwarranted delegation of legislative authority by the Congress. They protest that they cannot take advantage of competitive open market conditions, that they may be forced to substitute other fuels and that the enforcement of the Act constitutes an invasion of their constitutional rights.

Late in October Secretary of Interior Harold L. Ickes took occasion during a radio broadcast to plead for cooperation on the part of the producers of coal in his administration of the National Bituminous Coal Act under the new Bituminous Coal Division. His address was largely based on recommendations contained in a report on energy resources issued some months ago by the National Resources Committee. Aware of the opposition to the Guffey Act demonstrated by coal producers representing one-half of the commercial tonnage of the country, Secretary Ickes said: "I know that some of you honestly feel that any effort of the Government to aid your industry—particularly through this Coal Act—is objectionable, and I respect your opinion, although I do not agree with it."

The opposing coal producers made sharp reply to the Secretary's address and stated that while the Secretary had referred to chaotic conditions within the industry, these conditions, if they did exist, were chargeable directly to the Guffey Act and to the maladministration which has accompanied it. They stated distinctly that "coal producers have been deluded into the false hope of release through the fixing of prices in Washington, and have therefore neglected coordinated action among themselves through marketing agencies, which offers real promise for prompt improvement in the industry and for the attainment of conservation by an orderly and practical democratic method."

It is believed in many quarters that when the United States Congress assembles on January 3 there will be increased sentiment for repeal of the Guffey Act and refunding of the taxes which have been collected from coal producers.

Mastodon Bones Unearthed in West Virginia

A strip mining steam shovel recently unearthed bones of a mastodon near Bethany, W. Va. The bones were uncovered in a clay stratum nearly 20 feet below the surface of the earth.

New Equipment and Improved Practice in Metal Mining

(*Continued from page* 21)

longitudinal stopes, sometimes only 50 ft. long, in horizontal slices. Stoped sections are thus open for only a short time.

In gold dredging, the use of the Ward-Leonard control has greatly simplified the operation of dredges and makes for smoother operation. Also, motors now give sufficient torque at reduced digging speeds. In the older designs, a reduction in speed below the full operating speed resulted in a greatly reduced motor torque. Because of this improved control and the use of two motors, one at each end of the upper tumbler shaft, the speed of buckets on the digging ladder has been increased from 20 per minute to as many as 30 or even 34 buckets per minute past a given point. In ground that is relatively easy to dig, this increase in number of buckets filled per minute means a corresponding increase in the capacity of the dredge in 24 hours. By using heavier design in parts subjected to the greatest stresses, the actual operating time of dredges is now commonly as high as 22 hours and 30 minutes out of 24 hours, on a monthly or even yearly basis. Recent designs enable a dredge to dig as much as 125 ft. below water level, and by carrying a bank 20 ft. high, a total depth of 145 ft. below the surface is attained. A bank 30 to 40 ft. high can be carried if a hydraulic giant is used to cut down the upper part of such a bank, otherwise there is danger of the bank caving onto the digging ladder and damaging the dredge.

In diamond drilling, compact forms of drills are made for underground work in mines. Truck-mounted or motorized drills are designed for quickly moving from one location to another on the surface. Improved bits, with many small stones mechanically set, have made it possible to increase the revolutions per minute from 300 or 400 to 800 or 1,000 or even 1,200, with a resultant increase of 50 percent or more in drilling speed. This faster drilling has required a change in design of drills. Working parts run in oil and are enclosed. Chucks with countersunk boltheads are a safety feature. Ball bearings are used throughout, and provision is made for pressure greasing. An approximate ranking of types according to power used is 70 percent gasoline, 20 percent electric, and 10 percent steam.

Machine Maintenance—Practices, Procedure and Records

(*Continued from page* 14)

3. Careful operation. Proper preparations and good power stimulates careful operation.

4. Proper maintenance. This is vastly easier to obtain when proper preparation, good power, and careful operation is the general practice.

5. Close, rigid, weekly inspection of equipment.

This is the only possible way to keep all the production equipment operating at the highest possible efficiency at all times. We always find our loading machines with the highest daily average tonnage are the machines with the lowest maintenance cost, with the highest number of tons yield per shell used. Lowering the standard of the work performed as connected with any of the five factors mentioned, seriously affects the results that should be obtained from the remaining four factors.

Conclusion

In conclusion, I wish to say that any records or statements that have been mentioned in this paper are not pointed out or held up to be feats of accomplishment by a maintenance department that has solved all its problems. Far from being so. Because you know as I know that the costs of running our departments and the results we obtain are to some extent governed by conditions and factors over which we have little if any control.

This maintenance department just described has been blessed with the good fortune of being one of the few departments that has enjoyed the servicing of equipment which operates only one shift out of the 24 hours, serving an operating department which has had years of mechanical loading experience; and they have wholeheartedly cooperated with us in helping solve our problems.

The shop records and practices that I have mentioned are the means we use in forearming ourselves with information that we can rely upon in making our decisions and forming our methods of attack on new problems.

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

PROGRAM FOR THE ANNUAL CONFERENCE

A RESUME of the past year's activities of the Coal Division Committees of the American Mining Congress will be presented at the annual conference of the Coal Division at the William Penn Hotel, Pittsburgh, on Friday, November 17, 1939. An extremely interesting meeting is promised; a number of the Committee reports on various phases of mine operation will be submitted and discussed during the day, and in addition, at the dinner on Friday night, there will be several addresses by leading coal executives who are members of the Division's Advisory Council. The Conference is by no means confined to Committee members, and a cordial invitation is extended to all coal operators to attend and to take part in the discussions.

For several years the Committees have been engaged in making studies and compiling data on improved operating methods in coal mining. Their reports, published in the MINING CONGRESS JOURNAL, in the Yearbook of the American Mining Congress, and in special bulletins, have become recognized as authoritative in showing correct methods and practices, and the descriptions and recommendations which they contain are of practical value to operating men. The purpose of the coming Conference is to bring together the men who are making these studies so that they may correlate their findings and present an agreed report to the Conference for acceptance or correction.

In order to carry out this purpose, and as shown in the accompanying program, all Committees will convene at 10 a. m., and after a brief opening address, each Committee will then go into a separate meeting. These meetings will allow each group to review and approve their report to be presented to the General Conference starting at 1 p. m.

At the General Conference, a number of very constructive reports will be presented by the various Committees; some of these will be submitted in their completed form, while others will give an outline of studies that are now under way. Lantern slides and printed copies will be used to illustrate the type of material which the reports contain; each Committee will give to the Conference a complete account of the lines they are following, and an open discussion on each project will be invited.

The Committee on Roof Action has divided their study into three major parts: (a) permanent entry supports; (b) temporary supports for working faces; (c) action of overlying strata. Some preparatory work has been done on projects (a) and (b), which will be explained by the Committee.

The Committee on Mechanical Loading has completed a series of reports on time studies and daily face reports. A form sheet for daily repairs and inspection has been completed by S. M. Cassidy, Weirton Coal Company, and this will be submitted for approval.

The Committee on Conveyor Mining has started a study on conveyor mining plans. A number of typical installations for single and multiple units have been collected by the Committee, and these will be shown on lantern slides.

The Committee on Power has inaugurated studies on "AC Power Underground" and "Location of Substations." An outline of the scope of these two reports will be submitted, together with illustrations of preliminary studies that have already been made.

The Committee on Surface Preparation will present their completed report on "Factors Affecting Coal Screening." A preliminary report on this subject has been submitted to the committee for their approval or correction, and a subcommittee report will submit a tentative recommendation for a method to determine moisture in washed coal samples.

The Committee on Safety has prepared a report on "Recommended Safety Rules for Coal Mining." These rules are now under review by the committee and will be submitted to the Conference in their completed form.

The Committee on Haulage Roads has started a study on service haulage roads. A number of typical and successful plans will be gathered by the Committee for their preliminary study, and several of these will be shown to the Conference.

PROGRAM

Annual Conference of the A. M. C. Coal Division

William Penn Hotel, Pittsburgh
November 17, 1939

OPENING SESSION: 10:00 a. m.
Introduction: Julian D. Conover, Secretary, American Mining Congress

COMMITTEE MEETINGS: 10:30 a. m.
Each Committee will go into a separate meeting to prepare its report.

GENERAL CONFERENCE: 1:00 p. m.

COMMITTEE REPORTS:
- Committee on Roof Action — F. G. Smith, Chairman
- Committee on Mechanical Loading — Newell G. Alford, Chairman
- Committee on Conveyor Mining — T. F. McCarthy, Chairman
- Committee on Power — Carl Lee, Chairman; C. C. Ballard, Vice Chairman
- Committee on Surface Preparation — T. W. Guy, Chairman
- Committee on Safety — J. J. Sellers, Chairman
- Committee on Haulage Roads — R. V. Clay, Chairman

ANNUAL DINNER: 6:30 p. m.
Toastmaster: R. L. Ireland, Jr., Chairman, Coal Division
Addresses by Members of the Advisory Council
General Discussion

THE COMMITTEE ON CONVEYOR MINING

THE Conveyor Mining Committee is preparing a report showing a number of conveyor plans that are being used in various parts of the United States and under different seam conditions. It is a well-known fact that there are few conveyor installations that are exactly alike in every particular, as certain conditions require special treatment, and in preparing their study the Committee does not intend to submit descriptions of all the different mining plans that are in operation. They will, however, endeavor to show typical installations that represent basic principles, and the accompanying plans will illustrate the procedure that the Committee contemplates.

The simplest form of conveyor installation is the single unit, and figures 1 and 2 show two typical arrangements of this type. Each of these plans can be amplified so as to have two units working simultaneously on each heading, but in effect each is a single unit installation.

Both plans illustrate a method that was originally used with great success, although later developments have trended toward multiple rather than single units. The simplest form of a multiple unit is to install a short gathering conveyor onto which the room conveyor is discharged and which in turn brings the coal to a common loading point. Such an installation could be had by merely an enlargement of the plans shown in figures 1 and 2. However, the installation cost of the loading point is one of the major items of expense in conveyor mining, and the more recent plans have a loading point which will serve several multiple unit batteries.

Figures 3 and 4 illustrate plans of this type. The plan for figure 3 shows two rooms working simultaneously but with dotted lines to show how the next two advance rooms can be brought to this same loading point. It is of course obvious that the rooms working on the opposite side of the entries can also be brought to this same discharge. Figure 4 shows a different arrangement to accomplish the same purpose, and further uses a double track to facilitate the car movement and eliminate delay during trip changes. In case wide entries are not feasible, the double track arrangement can be obtained by placing the second track in the adjoining entry.

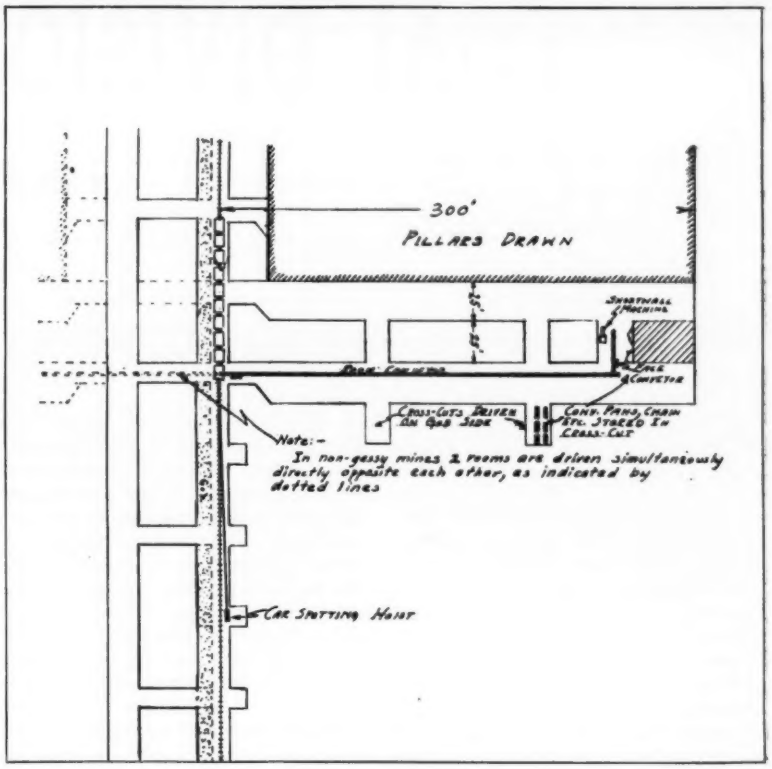

300'
PILLARS DRAWN
Note:-
In non-gassy mines 2 rooms are driven simultaneously directly opposite each other, as indicated by dotted lines
CAR SPOTTING HOIST

Figure 1. Single conveyor unit

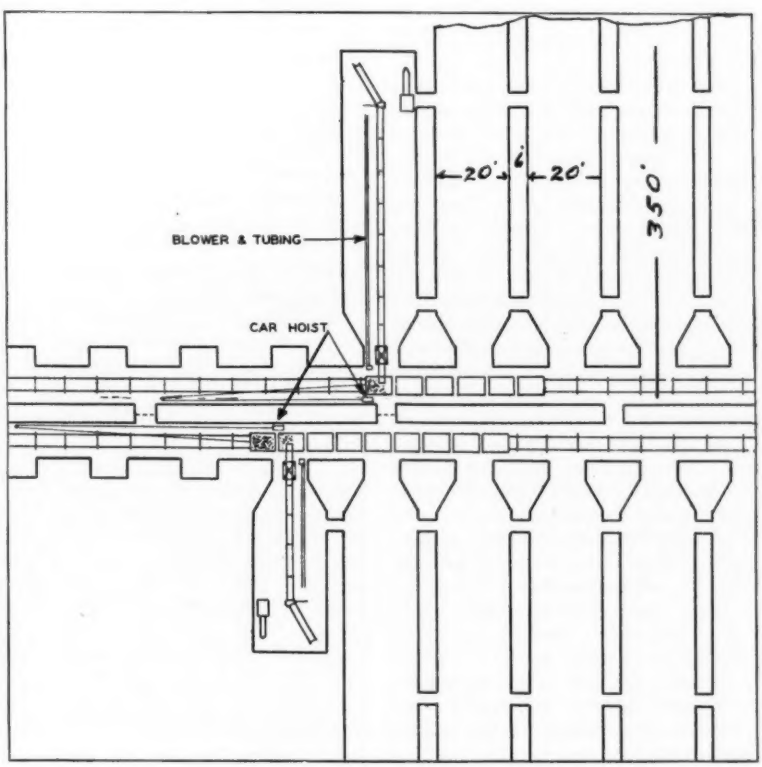


Figure 2. Two single conveyor units on double entry

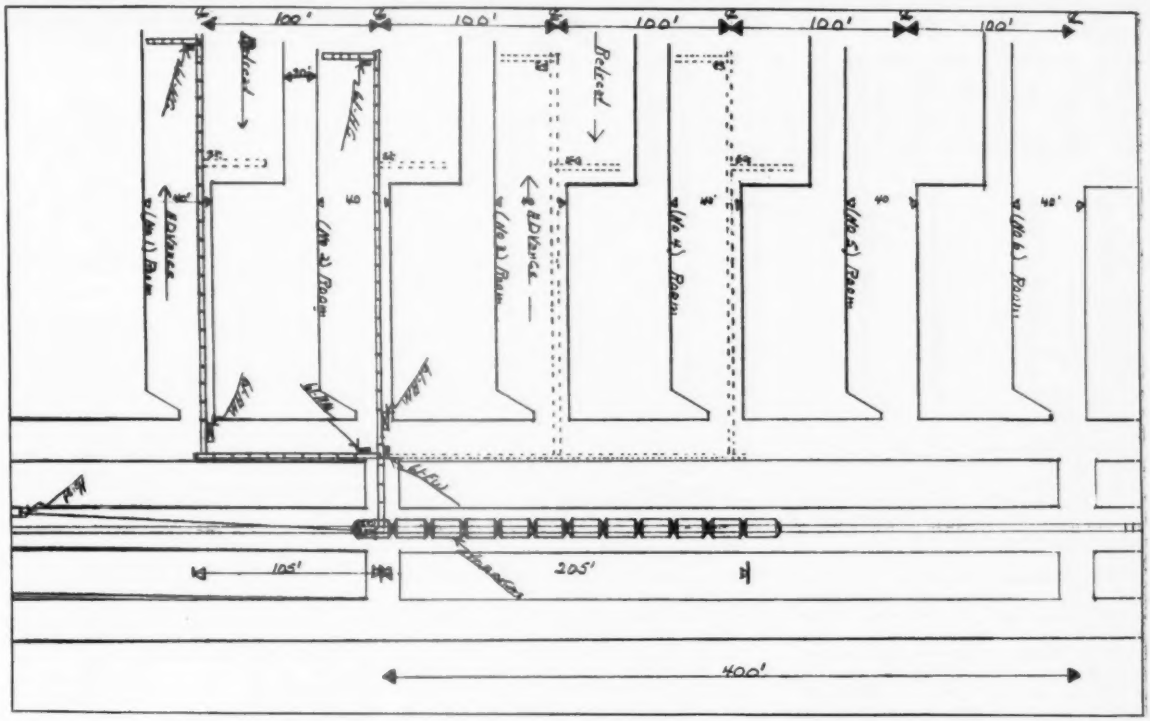


Figure 3. Multiple room unit with multiple loading point on single track

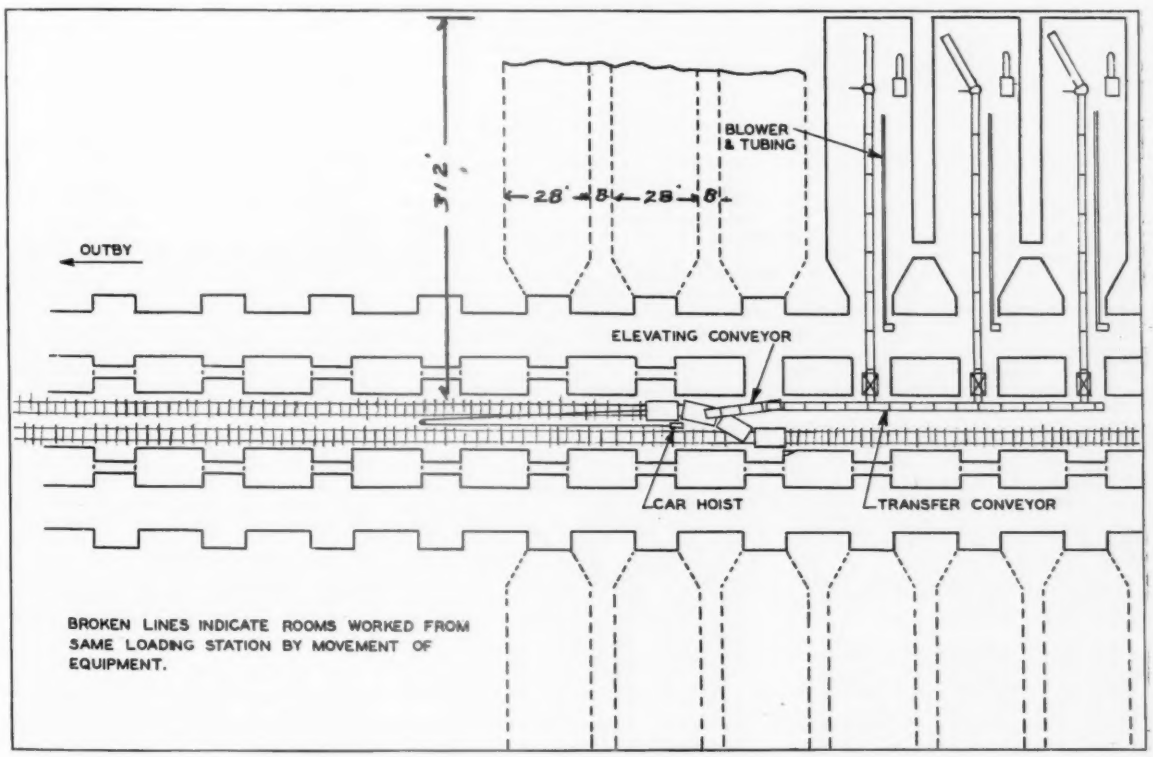


Figure 4. Multiple room unit with multiple loading point on double track

PERSONALS

Dr. Louis D. Ricketts, consulting engineer, was unanimously elected "The James Douglas Gold Medalist for 1940" at a meeting of the board of directors of the American Institute of Mining and Metallurgical Engineers held October 19. This award was made to Dr. Ricketts "for inspirational leadership and distinguished achievements in the metallurgy of copper." It will be presented to him at the annual meeting of the institute in February, 1940.

J. W. Woomer, chief mining engineer for the past two years for Hanna Coal Company, resigned this position September 15 to become general manager of mine operations of The Warner Collieries Company and chief engineer of the Jefferson Company. His headquarters will be in St. Clairsville, Ohio.

Following his graduation from Penn State as an engineer of mines, Mr. Woomer spent two years as an engineer and mine superintendent in Maryland, after which he served the Pittsburgh Coal Company as mine superintendent for 10 years. From there he went to the Hanna Coal Company.

Carroll B. Huntress, eastern sales manager of the Republic Coal & Coke Company of Chicago, attacked the proposal of the New York Power Authority to create a St. Lawrence Authority to utilize water power in New York State, at the annual convention of the New York State Solid Fuel Merchants Association held at Saranac Inn, N. Y., September 21.

Michael Curley has announced that he will retire on December 31, as manager of the New Cornelia Branch of Phelps Dodge Corporation at Ajo, Ariz. Mr. Curley has been associated with the Ajo property since 1913, serving first as superintendent under the late General John C. Greenway.

Succeeding him at Ajo will be **Charles R. Kuzell,** now smelter superintendent of the United Verde Branch at Jerome, Ariz. Mr. Kuzell has been associated with the Jerome property since 1918, prior to which he had worked for Anaconda Copper Mining Company, at Great Falls and Anaconda, Mont., for eight years.

William A. Ross was elected president of Columbia Steel Company, subsidiary of United States Steel Corporation on the Pacific Coast at a meeting of the company's Board of Directors held in San Francisco, September 1. Mr. Ross succeeds Ambrose N. Diehl, who resigned because of ill health, and who has headed the steel company since 1932.

Mr. Ross has been connected with the steel industry since 1895, when he went to work for the old Washburn Moen Manufacturing Company which was acquired by the American Steel & Wire Company in 1899. In 1930 he was named vice president and treasurer of Columbia Steel Company, and in 1932 was appointed vice president and general manager of sales, having served in this capacity until his election to the presidency.

With his resignation, Mr. Diehl finished a long and active career in the steel industry which began in 1899, having served as vice president of the United States Steel Corporation from 1930 to 1932, and as president of Columbia Steel Company from 1932 until his recent resignation.

Dr. Stephen P. Burke, consultant, associated with the Consolidation Coal Company, has gone to Columbia University in New York to act as visiting professor in engineering during the school year 1939-1940. His consulting services will be continued through his Washington office during the time he is teaching, with **John F. Havener,** his assistant, in charge of the office.

A. G. Zima, West Coast representative of the Research Division of the International Nickel Company, presented an address on "Nickel Alloy Steels" before the Oregon Chapter of the American Society for Metals on October 12, at Portland, Oreg.

John J. Curzon is now general manager of the Chelan Division of the Howe Sound Company, Holden, Wash., and **J. K. Brooke** has been named mine superintendent.

Avery C. Adams has been elected vice president in charge of sales and a member of the Executive Committee and Board of Directors of the United States Steel Corporation of Delaware, effective October 1. Mr. Adams succeeds C. V. McKaig, who is now assistant to the president, with duties as may be assigned. Mr. McKaig continues as a member of the Executive Committee and Board of Directors. Mr. Adams has spent his entire business career in the steel industry, having had several years of experience in steel mills in the Youngstown district, and specializing in metallurgy before entering sales work.

John G. Barry, consulting mining geologist and engineer, has moved his office in El Paso, Texas, to 1611 North Mesa Avenue, where he will have enlarged facilities for his work.

Fred E. Gray, manager of Desert Silver, Inc., Nevada, is recovering from an emergency appendectomy performed late in August at Tonopah. Mr. Gray was state chairman for Nevada on the Program Committee of the Metal Mining Convention of the American Mining Congress held recently in Salt Lake City, his illness having prevented him from joining his many friends at Salt Lake on that occasion.

Ronald Henry Rennie, general manager of the Giant Division, Atlas Powder Company, celebrated the anniversary of his fiftieth year of continuous service in the explosives industry on August 12. Mr. Rennie started in the powder business in 1889 as office boy for the Giant Powder Company. A testimonial banquet in Mr. Rennie's honor was held in San Francisco on the anniversary date as the climax of a sales meeting.

Capt. George Darlington, well-known iron man on the Mesabi Iron Range, retired from active service October 1, after completing 36 years' service with the Wisconsin Steel Mines of the International Harvester Company. At the time of his retirement, Mr. Darlington was general underground mining captain for the International Harvester iron mines, a position which he had held since early 1921.

—*Obituaries*—

George W. St. Clair, one of the leading coal operators in the southwestern Virginia and southern West Virginia coal fields, died October 19 in Tazewell, Va., at the age of 73, following an illness of 18 months. Mr. St. Clair was president of the Jewel Ridge Coal Corp., the Pocahontas Mining Co., and the marketing agency for the two concerns, the Virginia Smokeless Coal Co.

John A. Fulton, director of the Mackay School of Mines of the University of Nevada since 1924, died October 9 in San Francisco at the age of 61. His long career in mining included work for mining interests in South Africa from 1901 to 1906, and for mining concerns in Nevada, California, and Canada from 1909 to 1924.

D. Frederick Hurd, secretary-treasurer of the Ohio Coal Association, died in Cleveland October 6, in his seventy-fifth year. Mr. Hurd was nationally known in the coal-mining industry as an authority on freight rates and coal marketing problems.

W. C. McCall, mining engineer of Logan, W. Va., died in Huntington October 9 as the result of an operation. His age was 58.

Mr. McCall was a widely known coal expert throughout the state, having aided in developing the Island Creek Coal properties at Holden, and later opening and managing an office for the W. G. Wilkins Company in Logan.

NEWS and VIEWS

Arizona Small Mine Operators Jamboree

Hundreds of mining men from all parts of Arizona thronged to Tucson on October 28 for the second annual jamboree of the Arizona Small Mine Operators Association. With general arrangements under the supervision of C. M. D'Autremont, enthusiasm ran high over the successful results of the meeting.

Sessions ran from 10 to 12 in the morning and from 2 to 4.30 in the afternoon, and speakers included: G. M. Butler, dean of the College of Mines and Engineering at Tucson; Dixon Fagerberg, C. P. A., and president of the Arizona Society of Public Accountants; E. D. Gardner, United States Bureau of Mines; J. E. Russell; William Alberto, state land commissioner; J. S. Coupal, director of the Department of Mineral Resources; S. J. Clausen, Jr., scout for Howe Sound Co.; Michael Curley, general manager of the New Cornelia Branch, Phelps Dodge Corp.; J. Hubert Smith; Brent N. Rickard, American Smelting and Refining Co.; James F. Boyle; Lyman L. Dixon, Arizona Wage-Hour Administrator, and Thos. E. Campbell, former governor of Arizona.

Subjects discussed by these capable speakers were the land withdrawal menace, strategic minerals, state land policies, severance taxes, mine financing, the problems of capital in finding new mines, the tax load on basic industries, developments in Washington favoring the small mine operator, wage-hour laws, mine-to-market roads, the future of silver, reciprocal tariff treaties, and other subjects of vital concern to the small mine operators of Arizona.

Featured at separate noon luncheons in the Santa Rita Hotel were conferences of council chairmen and of council secretaries. The jamboree was concluded in the evening by a well attended dinner, at which everyone enjoyed a fine program of varied entert inment.

Prize Coal Sales Campaign

Well earned recognition was recently accorded the Truax-Traer Coal Company and the Cabin Creek Consolidated Sales Company for their series of sales letters when they were awarded a cup in New York City on September 20 for the best advertising campaign, and also were included as a prize winner in the annual travelling exhibit by the Direct Mail Advertisers Association.

The campaign, prepared under the direction of Harry V. Miles, advertising director of Cabin Creek Consolidated Sales Co., was planned to bring the individual coal merchant into greater prominence in his own community. The letters for which the award was made consisted of eight cleverly executed mailing pieces illustrating and describing important steps in use of fire by man as civilization advanced. Beautiful and appropriate three-color illustrations tie in closely with cleverly conceived copy to arrest the attention of readers, and invite them to follow all the way through to the company's brief sales message at the end.

This is the type of sales promotion activity that will go a long way in regaining markets for coal, and placing the industry on a healthier basis.

U. S. Ferromanganese Capacity Increased

The United States' annual capacity for the production of ferromanganese, an essential in steel manufacture, was increased by 30,000 tons when the Sloss-Sheffield Steel & Iron Company launched a new ferro manufacturing program October 15 by putting in blast its No. 4 furnace in North Birmingham, Ala., for production of this strategic material.

Approximately equal to the amount of ferromanganese now being imported, this increase is significant at a time when shipments from abroad face mounting war-time dangers, it was pointed out. U. S. imports in 1938 were 26,258 tons, and in 1937, 25,599 tons. The major portion in 1938 was imported from Norway, followed by Holland and Czechoslovakia.

It was emphasized that the ferromanganese to be manufactured here by Sloss-Sheffield would be made from manganese ores shipped from Cuban deposits. Improved processes for the beneficiating of low grade deposits there have recently been developed by American capital. Because of the relatively safe sea lane from Cuba to Mobile, the inauguration of an additional American ferromanganese producing unit using the Cuban raw material was viewed as contributing to the self-sufficiency of the American steel industry in the light of disturbances of ocean-borne shipments from such manganese ore producing countries as Russia, India, Africa and Brazil.

Ferromanganese, made from manganese ore, is necessary as a deoxidizer and desulphurizer in the manufacture of steel. About one ton of ferro is needed in making 160 tons of steel.

Reserve Mining Co. Takes Over Properties of Mesabi Iron Co.

In a transaction which rivals in importance any completed in the Lake Superior iron district in years, the Reserve Mining Company exercised on October 24 an option to acquire by assignment the leases of all Minnesota properties held by the Mesabi Iron Co. and to acquire all properties in the state owned by the same company. This option has been held since June 28, 1939.

The Reserve Mining Company, an organization recently formed to handle this Mesabi Iron Co. transaction, was sponsored by Oglebay, Norton & Co., of Cleveland, and is now controlled by the following important iron ore consuming interests: American Rolling Mill Co. and Wheeling Steel Corp., each of which owns 33⅓ percent interest; Montreal Mining Co., a subsidiary of Oglebay Norton & Co., with 23⅓ percent interest, and Cleveland-Cliffs Iron Co., with 10 percent interest. Properties involved in the transaction are situated near Babbitt, Minn., on the eastern Mesabi.

R. C. ALLEN

Directors of Reserve Mining Co. are: Calvin Verity, executive vice president, American Rolling Mill Co.; J. C. Miller, vice president, American Rolling Mill Co.; W. W. Holloway, president, Wheeling Steel Corp.; A. J. McFarland, vice president, Wheeling Steel Corp.; G. G. Wade, president, Montreal Mining Co.; E. B. Greene, president, Cleveland-Cliffs Iron Co., and R. C. Allen, vice president of Oglebay, Norton & Co.

Officers of the new company are: R. C. Allen, president; J. C. Miller, first vice president; W. W. Holloway, second vice president; R. C. Norton, treasurer; A. C. Bishop, secretary, and R. H. Weir, assistant secretary.

Anthracite Employment Statistics in 1938

Final figures recently released by the U. S. Bureau of Mines show that a grand total of 96,417 workers in the Pennsylvania anthracite region produced an average of 2.79 tons of anthracite per man day. Average number of days plants operated was 171, and total man days of labor were 16,533,533.

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CONSTITUTIONALITY OF COAL ACT UNDER FIRE

• *Coal Division Moving Into Last Stages of Coordination*

While the Bituminous Coal Division of the Department of Interior maintained its cautious but creeping pace towards final establishment of minimum prices, the city of Atlanta pushed its contentions of the Coal Act's unconstitutionality into the hands of the highest court in the land. The Supreme Court has accepted the case for hearing and a decision is expected during the present session.

The city of Atlanta has asked the Supreme Court to rule that ". . . the National Bituminous Coal Act of 1937 is contrary to the Constitution of the United States; that the National Bituminous Coal Commission is without authority to promulgate minimum price orders; and that if said Bituminous Coal Commission shall issue minimum price orders, that said orders are not applicable to appellant or any coal purchased by it."

Specifically the city's case contends the price provisions of the Act violate the due-process clause of the Fifth Amendment, that the price-fixing provisions are contrary to the public interest and benefit only a particular class, that the Act does not promote interstate commerce and remove burdens or obstructions to that commerce or prevent unfair competition, and that the price-fixing provisions constitute an unwarranted delegation of legislative authority by the Congress.

Atlanta further claims that under the proposed price schedule it must pay a fixed price for coal, that it cannot take advantage of competitive open-market conditions. By such a situation, contends Atlanta, it may be forced to substitute other fuels, and in so doing will be experiencing an invasion of its constitutional rights.

The Department of Justice and the Bituminous Coal Division of the Interior Department presented a brief before the Supreme Court in which they contended that:

1. The suit is premature, since Atlanta alleges only it will be injured when prices are fixed, whereas no prices were fixed when the suit was filed.

2. The city of Atlanta failed to exhaust administrative and judicial remedy provided by the Coal Act.

3. The city, as consumer, has no standing to maintain suit because price-fixing will deprive it of no legal right.

4. The city is not entitled to declaratory judgment because there is no justifiable controversy until the Coal Division has fixed prices.

The Coal Division goes into the Supreme Court test backed by the decision of the Court of Appeals for the District of Columbia, which upheld the constitutionality of the Coal Act and granted the Government's motion for dismissal. In the appellate court decision it was held that the Act was a valid exercise of Congress' power over interstate commerce, that it did not violate the "due-process" clause of the Constitution, that it contained no invalid delegation of legislative power, and that minimum prices could validly be applied to sales of coal to a subdivision of a state. There is some doubt as to whether the Supreme Court will rule on the Act's constitutionality at the moment, according to seasoned observers. They point to the adamancy of the court to rule on the constitutionality of any important laws in recent cases, and in their opinion it is entirely possible that the court may dismiss the present case as being premature.

Meantime the Coal Division is winding up its mid-western coordination hearings and is preparing to hear from producers in market areas 200-212 which embrace a geographical swath from North Dakota to Texas. This hearing will tie in the Far West hearing held in Denver and the Middle Western hearing held at Washington.

For the past month Dr. Charles J. Potter, the Division's key witness and marketing expert, has been on the stand explaining verbally and with numerous exhibits the coordinated relationships between competing coals in each price area, and has outlined how such relationships were determined. For fully a week, Mr. Potter was subjected to steady cross-examination. He will remain on the stand during the new hearing and at the conclusion of his testimony evidence by district boards, producers, consumers, and other interested parties will be heard. Following conclusion of these presentations questions of realization must be ironed out.

From the evidence presented at the hearings, the trial examiners of the Coal Division will make findings of fact which will be reported to Director Gray and made public. Then the Commission will hear the protests and exceptions to the findings. After these hearings have been completed the minimum prices will be established. During recesses of the present hearings the trial examiners have been engaged in preparing preliminary findings of fact. The Division apparently is engaging in "wishful thinking" when it says prices may be announced by January 1—statements from the Division say we are "shooting for January 1," but indications are that chances for announcement of prices by January 1 are slim.

A concerted program has been undertaken by the Coal Division to plug all possible "loopholes" before prices are promulgated. Included in this program have been:

1. A study has been launched into contracts for the sale of bituminous coal for which producers might claim exemption from minimum prices and marketing rules and regulations. The Division has issued an order directing each coal-code member (there are some 12,000) to report whether he has any such contracts outstanding, and if so with whom, the details of contracts, and whether copies were filed with the old Bituminous Coal Commission.

2. Setting in motion of machinery to subject to the price provisions of the Act producers of bituminous coal in mines which are not included in any of the districts described in the Coal Act. Object, the Division states, is to eliminate the possibility of unfair competitive situations arising after establishment of minimum prices between producers whose mines are located within the territorial jurisdictions of producing districts as described in the Coal Act and those who might be operating mines located in territory not originally included within such jurisdiction. The new proposals affect territory in Pennsylvania, Kentucky, Tennessee, Virginia, North Carolina, Idaho, and New Mexico.

3. Settlement of pending applications for exemption from the provisions of Section 4 of the Coal Act has been initiated and is expected to be accomplished by agreement between the Division and the applicants.

The only suit to date involving the application of Section 9 of the Coal Act—the section which forbids Government coal contracts to firms which deny the rights of self-organization and collective bargaining to their employes—was dismissed by the Sixth Circuit Court of Appeals at Cincinnati. Dismissal of the suit, which was brought by the West Kentucky Coal Company at Sturgis, Ky., challenging a former order of the old National Bituminous Coal Commission, was reached following settlement of the issues by stipulation between the company, the Department of Justice, and the Bituminous Coal Division.

Lake Superior Mining Institute Elects Peterson

A. Y. Peterson, general manager of the Oliver Iron Mining Company at Duluth, Minn., was elected president of the Lake Superior Iron Mining Institute at the recent meeting held in Watersmeet, Mich. He succeeds A. D. Chisholm, of Duluth, who held that office for the past three years. C. J. Stakel, Ishpeming, Mich., was re-elected secretary, and Ralph S. Archibald, Negaunee, Mich., was named treasurer to succeed the late John D. Nelson, of Duluth.

This year's meeting on the Gogebic Range was one of the most successful held since the Institute was organized. Registrations numbered over 400, and 145 new memberships were granted. The next meeting will be held on the Mesabi Range.

Safety Lights Feature Repaired Shaft

Evans Wallower Zinc., Inc., have repaired their 8-B shaft, including the derrick, on the old Dorothy Bell lease in the Tri-State district. This shaft is used in handling men and supplies for the No. 7 mines of the company, according to Floyd Gooch, Joplin, company manager. It was placed in operation in mid-September.

The shaft includes a unique safety feature which provides clear visibility

for the hoister man from the collar to the bottom of the shaft—namely, use of projector lamps, together with the painting of the top of the safety can with aluminum paint. A spotlight lamp is used at the collar, and a floodlight lamp at the bottom, both of which illuminate the entire shaft all the way down to the bottom—about 212 ft. Movements of miners at the shaft bottom are thus clearly seen.

Important Decision on Gas Line Construction

An important decision was rendered by the Federal Power Commission late in October when it ordered the Kansas Pipe Line and Gas Company and the North Dakota Consumers Gas Company "to make further showing that firm commitments have been made for securing the funds necessary to construct the pipe lines proposed." The Kansas Pipe Line and Gas Company had applied for a certificate to construct a natural gas pipeline from southwest Kansas to the Mesabi Iron Range in northeastern Minnesota, and the North Dakota Consumers Gas Company asked a certificate to construct a natural gas pipeline from Mandan, N. Dak., to Crookston, Minn., via Fargo and Grand Forks, N. Dak. Both companies have applications pending before the Reconstruction Finance Corporation seeking to borrow funds with which to finance construction of the proposed pipelines.

Despite the fact that coal interests, the Bituminous Coal Commission (now Coal Division of the Interior), labor and railroad interests participated in the proceedings on these applications and urged that certification of the proposed pipeline would affect them adversely, the opinion, which is one of the most important rendered under the Natural Gas Act, states:

"We have already noted that Section 7 (c) of the Natural Gas Act does not give us unlimited jurisdiction over all proposed construction of facilities for the transportation of natural gas, but that our jurisdiction attaches only when the proposed construction is of facilities for the transportation of natural gas in a market in which natural gas is already being served by another natural-gas company.

"In the light of that restriction on our jurisdiction and having regard to all other provisions of the Natural Gas Act, it would appear that Congress did not intend this Commission generally to weigh the broad social and economic effects of the use of various fuels. Under Section 7 (c) of the Act our duty is to safeguard the convenience and necessity of the public as it may be affected by proposed extensions or constructions of facilities for the transportation of natural gas to markets, as herein defined, in which natural gas is already being served by another natural-gas company. We see nothing in the legislative history of the Natural Gas Act to alter our conclusions hereon."

Kansas Pipe Line and Gas Company and North Dakota Consumers Gas Company have each filed applications under Section 7 (c) of the Natural Gas Act for certificates of public convenience and necessity for authority to construct and operate facilities for the transportation and sale of natural gas in interstate commerce to certain specified towns in eastern North Dakota and western Minnesota, but apart from these specific points of conflict the proposed projects are dissimilar both as to route and territory proposed to be served.

The Kansas Pipe Line and Gas Company filed an application with the Commission, September 10, 1938, seeking authority to construct a 1,300-mile natural-gas pipeline from the Hugoton fields in southwestern Kansas to points in Kansas, Nebraska, South Dakota, North Dakota, and Minnesota. From a point on the proposed main line in Stevens County, Minn., the company proposes to build a branch line which would transport gas to the cities of Moorhead, Crookston, and East Grand Forks in western Minnesota, and Fargo and Grand Forks in eastern North Dakota, among others. Through the entire route of the proposed facilities the company intends to provide natural gas for resale or direct distribution in some 129 communities as well as directly to several individual industrial consumers along its proposed route. The application of the company indicates that it is contemplated that a sufficient volume of natural gas for processing low-grade iron ore would be made available at the Mesabi and Cuyuna Iron Ranges to make possible the utilization of large reserves of such ores which are now unavailable because of lack of low-priced fuel. The company estimates the cost of construction of facilities at $21,470,000.

The North Dakota Consumers Gas

Elkins Festival Features Display of Coal's Varied Uses

False teeth and radiator caps, poker chips and fishing reels, oil cans and costume jewelry, coal tar and steering wheels, stockings and camera cases—these and hundreds of other by-products and derivatives of coal, on display at West Virginia's annual Mountain-State Forest Festival at Elkins early in October, provided an outstanding tribute to the major natural resources and chief industry of the Mountain State.

Sponsored by the Upper Monongahela Valley Association, northern West Virginia development agency, the display drew more than 30 commercial exhibitors, ranging from the nation's leading plastics companies to by-products plants. Over 20,000 persons, among whom were at least 200 of the state's leading coal operators, viewed the displays.

In West Virginia's billions of tons of unmined black diamonds lie, to a great extent, the future of the state's industrial prosperity. The Forest Festival exhibit aimed to awaken in West Virginians a cognizance of the possibilities that exist in the processing of this resource to gain a few of the hundreds of by-products and thousands of derivatives for which coal is a principal base.

Companies exhibiting included the following: George F. Berkander, Inc.; J. T. Baker Chemical Co.; Bakelite Corp.; The Barrett Co.; C. & P. Telephone Co.; Chicago Molded Products Co.; Catalin Corp.; Durite Plastics; Durez Plastics & Chemical Corp.; Domestic Coke Corp.; Erie Resistor Corp.; Ford Motor Co.; General Industries Co.; E. R. Johnston Paint Co.; Kanawha Manufacturing Co.; Koppers Co.; Monsanto Chemical Co.; Mutual Sunset Lamp Mfg. Co.; Marblette Corp.; Neville Co.; E. I. du Pont de Nemours & Co.; Prickett Chemical Co.; Plaskon Co.; Pittsburgh Plate Glass Co.; Reilly Tar & Chemical Corp.; Sherwin-Williams Co.; E. R. Squibbs & Sons; Waterbury Button Co.; West Virginia University; West Virginia Department of Geology.

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Company filed an application for a certificate of public convenience and necessity on December 30, 1938, for the construction of a natural-gas pipeline from Mandan to Fargo, N. Dak., and Moorhead, Minn., from Fargo to Grand Forks, N. Dak., and East Grand Forks, Minn., and from Grand Forks to Crookston, Minn. The proposed facilities would approximate 198 miles in length. The applicant proposes to sell natural gas for resale, and distribute natural gas to various cities and towns and various corporations, state institutions, and individuals along the routes of the proposed lines. The North Dakota company estimates the cost of the facilities proposed to be constructed at $4,254,300.

The Commission's opinion points out the applicants have stated that they intend to rely for their financing in full upon the successful disposition of applications which each has filed with the Reconstruction Finance Corporation, and that neither applicant has submitted any firm commitment from the Reconstruction Finance Corporation that that organization would loan applicants the necessary funds. There is nothing in the record to indicate terms, conditions, type of securities, method of repayment, amount and other details of any financing program.

In its opinion, the Federal Power Commission indicated that if the applicants are able to make further showing satisfactory to the Commission on the financial matters indicated, the Commission will contemplate further action on the applications which would permit construction of facilities by Kansas Pipe Line and Gas Company "from a point in the Hugoton gas field, located in the State of Kansas, through or into the States of Kansas, Nebraska, South Dakota, and Minnesota to a point on the Mesabi Iron Range located in the State of Minnesota specifically excluding from such certificate authorization to construct facilities to or operate facilities in the cities of Breckenridge, Fergus Falls, Moorhead, Crookston, and East Grand Forks, Minn., and the cities of Grand Forks and Fargo, N. Dak."

If the further showing made by the applicant, North Dakota Consumers Gas Company, on the matters set forth above is satisfactory to the Commission, a certificate of public convenience and necessity to authorize the construction and operation of facilities for the transportation of natural gas will be issued.

National Coal Elects Dickinson

Charles C. Dickinson, president of the Dickinson Fuel Co., Charleston, W. Va., was elected president of the National Coal Association at the Convention of the organization held at the Hotel Roosevelt, New York City, October 23-25.

Featuring the meeting was a luncheon address by Secretary of the Interior Harold L. Ickes on October 25.

After emphasizing conservational aspects of fuel production, Mr. Ickes stated in closing, "I want to assure that I shall do my utmost to supervise and direct the administration of the Coal Act so that it will benefit the industry and the public. This law is the result of a chaotic condition of long standing. It represents the demands of a large portion of the producers of bituminous coal, as well as of the miners, for governmental aid in helping to rescue the industry from the depths to which it has been plunged as the result of prolonged price cutting. It is therefore only fair that industry and labor should join hands with the Government in giving the Coal Act a fair and honest trial."

Opposition to extension of federal control over the coal industry was evidenced by a statement released by a group of producers organized as the Committee for Amendment of the Coal Act, representing about one-half of the commercial tonnage of bituminous coal. They voiced their accord with the Secretary as to the desirability of conservation as a public policy, but asserted that such conservation will best be promoted under the terms of the Allen Bill now pending in Congress. This bill would amend the Guffey Act by repealing compulsory price-fixing provisions, substituting therefor cooperative agreements within the industry itself with respect to the marketing or regulation of the supply of bituminous coal in commerce. "The Allen Bill," they said, "has the virtue of pursuing a truly American, democratic course in national legislation, as contrasted with the authoritarian method of direct government control of private industry contained in the Guffey Law."

Commenting on the Secretary's reference to chaotic conditions within the industry, the Committee declared the situation may properly be laid at the door of the Guffey Law itself. "Under its operation," they stated, "coal producers have been deluded into the false hope of relief through the fixing of prices in Washington, and have therefore neglected coordinated action among themselves through marketing agencies, which offers real promise for prompt improvement in the industry and for the attainment of conservation by an ordinary and practical democratic method."

Other important features included in the three-day session were discussions on research, marketing and advertising.

Carlton Bore Driven at Record Speed

The new Carlton deep drainage tunnel in the Cripple Creek, Colo., district is being driven ahead at record speed. When completed, the new tun-

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nel will free the gold mines of the district of water to a depth of around 3,000 feet.

During the month of September, what is believed to have been a world's record for similar work was made when in 28 working days the tunnel was advanced a total of 1,367 feet. The bore will eventually be 32,000 feet in length, and will include many laterals to drain the district more completely.

Strategic Minerals Investigations Pushed

In a major effort to improve the position of the United States in regard to strategic minerals, the Bureau of Mines now has engineering parties in the field investigating the possibilities of eight mineralized areas. The action was taken in accordance with the Strategic Materials Act, which authorized the Bureau of Mines to appraise ore deposits containing metals that have been designated as strategic by the Secretaries of War, Navy, and the Interior upon advice of the Army and Navy Munitions Board.

The deposits now under investigation include antimony, chrome, manganese, tin, and tungsten. When President Roosevelt, commenting on possible foreign war demands recently, called upon owners of commercial stocks of strategic minerals to refrain from selling them to foreign buyers because of their vital necessity to this nation and because of the restricted supply available here, these minerals were among those he named.

The engineering parties now in the field will take samples from the deposits by excavation and drilling to ascertain their possibilities as sources of emergency supplies of these minerals. The work is being carried out in close cooperation with the U. S. Geological Survey, another agency of the Department of the Interior. The Geological Survey already has carried out extensive geological investigation of ore bodies upon which the Bureau of Mines is conducting exploration projects. The minerals to which the Bureau of Mines is paying particular attention include mercury and nickel in addition to those listed.

The projects now being explored by the Bureau of Mines are:

1. Valley County, Idaho—antimony deposits.

2. Sweetgrass and Stillwater Counties, Mont.—chrome deposits.

3. Casper Mountain, Wyoming—chrome deposits.

4. John Day, Oregon—chrome deposits.

5. Olympic Peninsula, Washington—manganese deposits.

6. Tinton, South Dakota—tin deposits.

7. Catron County, N. Mex.—tin deposits.

8. Nightingale District, Nevada—tungsten deposits.

The following statement was made public by the Bureau of Mines about these deposits:

In the Valley County, Idaho, district there has been in the past considerable production of antimony associated with ores of the precious metals. There are, however, some known deposits in which the values of the precious metals have been too low grade to warrant their mining. It is believed that a substantial source of antimony will be demonstrated in Valley County that would go far to relieve anxiety as to the supply of this metal in an emergency.

The chrome deposits in Sweetgrass and Stillwater Counties, Mont., are persistent veins upon which considerable development work has been done in the past. As the ores have been impaired in value by an intimate intermixture of chrome with iron, an important aspect of the problem will be investigations by the Metallurgical Division of the Bureau of Mines designed to demonstrate ways in which these ores might be most efficiently treated.

The chrome deposits at Casper Mountain, Wyoming, are believed to include an enormous tonnage of low-grade material extending for more than half a mile along a granite schist contact. This is in very rough country with an overburden that has rendered previous studies of these deposits difficult. With respect to the ores there will also be a metallurgical problem, as a characteristic difficulty of the western chromites is their more or less intimate association with excessive amounts of iron.

The project near John Day, Oreg., concerns another large area of chromite, low in grade, but with tonnage possibilities that may render it extremely interesting.

The Olympic Peninsula of Washington contains numerous deposits of manganese located in rugged country, which have had relatively slight development, though one of the mines has made a substantial production. The investigation here will be concerned with the determination of the nature of the more highly mineralized areas. They are not fully contiguous.

The tin deposits in the pegmatites of the Black Hills at Tinton, S. Dak., have long excited considerable interest as a source of some production. The difficulty has been that the occurrences of tin are so scattered that little conclusive information can be obtained through examination of face samples. The investigation therefore is aimed at the determination of the tin content of the more promising areas through the concentration of mass samples representing substantial tonnage.

The tin deposits of Catron County, N. Mex., are of chief interest because the depositions of tin in very small amounts per ton are found in rhyolite over a vast region, possibly exceeding 100 square miles. There is little hope that any known showing could be made commercial, yet it is conceivable that the tin concentrations might be more pronounced in some areas or that mining on a large scale could in an extreme emergency produce sufficient tin at high cost to deserve consideration. There are, in addition, some hundreds of miles of shallow placer concentrations in stream beds that might warrant high-cost recovery in an emergency.

The tungsten investigations started in the Nightingale District of Nevada relate to the possibility that large amount of high-cost tungsten could be obtained in an emergency from various contact deposits of the kind that are known to exist in a number of places throughout the country but especially in the Western States. The investigation will be carried out chiefly by diamond drilling. Reasonable success at this place might result in other similar investigations that would provide considerable assurance of substantial quantities of low-grade ore obtainable from domestic deposits even though at relatively high cost.

According to the Bureau of Mines, since the World War the strategic minerals situation of the United States has been improved in some respects but has become more aggravated in others. The nation is now better off in regard to nitrates, potash, platinum, molybdenum, vanadium, pyrite, and antimony than it was at that time. However, the rapid increase in the use of alloys has made us more dependent than ever on foreign sources of manganese, chromium, and nickel. The situation in these materials has been further aggravated by the depletion of the very limited high-grade reserves of manganese and chrome ores during the last war, and, in the case of nickel, by the transfer of refining operations from the United States to Canada. Since 1923, American manufacturers have obtained much of their ore for aluminum from South American bauxite deposits, and we are still dependent entirely on overseas supplies of tin.

While the prospects for disclosing large deposits of deficient strategic minerals in this country of present commercial grade are admittedly not bright, it is felt that relatively small deposits of commercial grade may be accompanied by "halos" of lower grade material that contain sufficient quantities of needed metal that could be extracted if the demand for the minerals becomes great.

Secretary Ickes stated that he had been advised by the Bureau of Mines that manufacturers have on hand fairly large stocks of strategic minerals and that no immediate shortages are anticipated. However, because acute shortages of mineral raw materials would be detrimental to the national defense, the Bureau of Mines has instituted monthly canvasses on the production, consumption, and stocks of strategic minerals in addition to starting the explorations authorized under the Strategic Materials Act.

Anthracite Operations Reopen

Partial resumption of operations at the long-idle Packer 2 and 4 mines and Weston breaker late in September, and New Boston Colliery early in October, increased the total of reopened collieries to seven for the year in the anthracite region near Shenandoah, Pa. This further lessened unemployment in the district.

Earlier in the year, Kehley Run, Fidelity Fuel and Packer 5 employes returned to work when the properties were taken over by new operators.

These seven collieries employ approximately 1,800 men. Based on a 200-day year, the annual payroll will amount to $1,800,000. An additional yearly payroll of $1,500,000 is assured when 1,500 more men regain their jobs in the near future at Morea, Hammond, Packer 3 and Park collieries.

Clark Optimistic for Coal in Birmingham Talk

An optimistic view of the coal situation as it relates to the near future was presented by Heath S. Clark, president of the National Coal Association, in an address at a banquet of the Birmingham Traffic and Transportation Club in Birmingham, Ala., September 20. Optimism was based largely on the effect of the European situation on industry in this country, but as to the precise extent and manner of improvement he did not venture to forecast. His conclusions were based on the history of other wars, and especially the World War, when the demand surpassed the supply, prices mounted and new mines were opened.

But after the war came the reaction, he said, and in the last 20 years the industry has lost much of its former trade, and now is faced with several competing services that have made wide inroads on its business. The railroads and the coal industry are in the same fix—both have lost business, both are struggling to keep their financial structures in condition to continue business, and both are faced with strong competition. But he believed both would work out their problems and regain their lost business.

Cited by Mr. Clark as some of the ills of the coal industry were (1) overcapacity, (2) under consumption, (3) loss of capital, (4) idle labor, and (5) slack demand. The cure for the ills is reduced capacity or increased consumption.

Cooperative sales agencies were described by Mr. Clark as one of the "cures" he would suggest, in view of the success so far obtained.

He said hydro-electricity cannot be produced as cheaply as coal power, whether the latter is produced through stock jobbing, legitimate promotion, or by the Government "hell-bent on social reform."

To recover lost markets, he said, coal must do so on its own merits, and he believed the promotional campaign recently inaugurated will go a long way in that direction. Mechanical mining and loading, resulting in lower production and transportation cost, will help improve the situation. He visioned a more efficient mining, closer relation between supply and demand, and the United States staying out of the war, which will restore coal to its former important position in the industrial world.

Mineral Resources of Pacific Northwest

Possibility that the Pacific Northwest, with its large storehouse of minerals and hydroelectric power, may soon develop important chemical industries was pointed out early in August to the Western Chemical Congress gathered at San Francisco by Ivan Bloch, Bonneville industrial research engineer. He discussed briefly the immense deposits of raw materials that await development in Oregon, Washington, Idaho and Montana, and asserted that these states together have all the 34 geological resources basic to industrial chemistry. Most are found within a radius of 500 miles of Bonneville Dam, first navigation and hydroelectric project on the Columbia River.

Detailed maps of these mineral deposits were made available to the chemical industry for the first time by Bonneville Administrator F. A. Banks. They were prepared with the assistance of the mining departments of the four states, and show virtually all important known deposits of iron, lead, zinc, chromite, copper, antimony, gold, limestone, manganese, mercury, nickel, tungsten and twelve other minerals. Fourteen more maps are in course of preparation, and all will be kept up to date to show latest discoveries.

Pickands, Mather to Appeal Labor Board Ruling

Gustaf B. Erickson, an examiner for the National Labor Relations Board, who last summer investigated complaints of unfair labor practice against Pickands, Mather & Co., together with four associated companies, recently filed an intermediate report recommending that the NLRB make findings adverse to the mining companies.

This action followed hearings last summer of employes of the Cary, Newport, Anvil and Sunday Lake Mines, held in Ironwood, Mich., and of the Zenith mine, held in Ely, Minn.

The examiner's recommendation was received with surprise by mining officials, and was shortly followed by an announcement on October 11 by A. D. Chisholm, general manager of Pickands, Mather & Co., as follows:

"The company will appeal to the National Labor Relations Board from the intermediate report of Gustaf B. Erickson, trial examiner, who conducted the recent hearings at Ironwood and Ely. The company feels there is no justification for the recommendation of the examiner, that his report is grossly unfair and is directly contrary to the evidence. Formal exceptions will be filed within a few days."

Coal Mining Institute of America

The fifty-third annual meeting of the Coal Mining Institute of America will be held December 14 and 15 at the Fort Pitt Hotel, Pittsburgh, Pa. G. W. Grove, 4800 Forbes Street, Pittsburgh, is secretary-treasurer of the organization.

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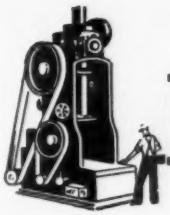


MANUFACTURERS' Forum

Link-Belt Speeder Corporation Organized

Announcement is made by Alfred Kauffmann, president, Link-Belt Company, Chicago, that the company has organized the Link-Belt Speeder Corporation, a wholly owned subsidiary but operated independently, with headquarters at 301 West Pershing Road, Chicago, for the manufacture and sale of power-operated excavating and materials-handling shovels, draglines, cranes, including a full line of track-type locomotive cranes.

This news follows closely on the heels of Mr. Kauffmann's announcement a few months ago of the consolidation of Speeder Machinery Corporation, Cedar Rapids, and the Shovel Division of Link-Belt Company, Chicago, which now become the Link-Belt Speeder Corporation. The products of the new corporation will be manufactured both at Cedar Rapids and Chicago, and marketed through a large list of authorized distributors.

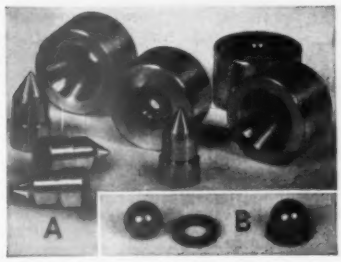
The organizing committee named the following directors to serve for the first year: Alfred Kauffmann, T. M. Deal, Walter Baker, W. C. Carter, H. E. Kellogg.

The directors have elected the following officers: Alfred Kauffmann, chairman of board; T. M. Deal, president; Walter Baker, vice president; W. C. Carter, vice president; H. E. Kellogg, treasurer; G. H. Olson, secretary; O. A. Prather, assistant secretary; H. E. Kellogg, assistant secretary; and F. V. MacArthur, assistant treasurer.

Kennametal for Pump Valves

Pump valves and other valves subject to unusual abrasive or corrosive action are now being successfully made of Kennametal, the new intermetallic compound of tungsten-titanium carbide, manufactured by McKenna Metals Co., 168 Lloyd Avenue, Latrobe, Pa. Recent tests indicate that valves made of Kennametal will far outlast valves made of other materials.

Illustrated (A) are several high-pressure needle valves, equipped with Kennametal needle tip and seat, which were used in experiments involving a tarry fluid containing grit. Previously it had been necessary to change as many as seven valves in 24 hours; however, the Kennametal-tipped valves and seats gave such good service that it was necessary to replace only one valve every one to two weeks.

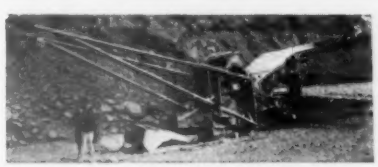


The superior strength of Kennametal balls and seats for oil well pump valves (illustration—B) is demonstrated by tests recently conducted by a large oil well equipment manufacturer. In these tests Kennametal balls were hammered against seats of Kennametal by a pneumatic hammer, using 300 blows per minute of ram, 25-lb.-per-sq.-in. air pressure, and 3/32-in. play between ram and ball and seat. After 105 minutes of hammering, the valves were still serviceable, as compared to a life of 9 to 11 minutes for tungsten carbide balls and seats. The Kennametal valves also showed superior resistance to corrosion in the waters of Louisiana oil wells.

Kennametal can be supplied in any desired shape for valve parts and in three grades having varying physical properties. Complete information on Kennametal balls for ball valves will be sent by the manufacturer upon request.

Improvement in Rock Loading Operation

The new Sullivan double-boom rock loader illustrated eliminates the need for anchoring tail sheaves at the face or heading and effects considerable saving in time and labor on the 24-ft. diameter diversion tunnel of the Colorado, Green Mountain Dam.



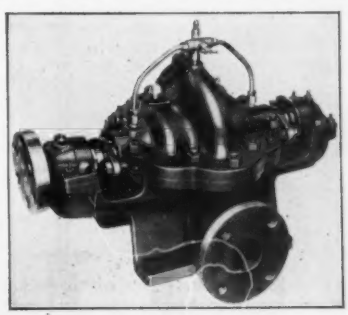
This new rock loader provides an efficient, low-cost, and extremely flexible method for digging, conveying, and loading. In the Green Mountain conversion tunnel an 8-ft. round of 200 yd. is mucked and loaded in three hours. The scraper reaches over the muck pile, removing first the rock close to the heading, so that drillers can drill the next round while the remaining rock is being removed. The loader operates on permanent track at from 25 to 50 ft. from the heading.

The loader is powered with a Sullivan 50-hp., electric-driven, three-drum scraper hauler, and by means of the two tail rope drums with their ropes running through the sheaves on the booms, the scraper can be placed in any position desired for digging. When operating, an 18-ft. spreader holds the booms apart.

This simple, efficient, and widely adaptable method of rock loading is fully described in Bulletin 76-A, just issued by the Sullivan Machinery Co., Woodland Avenue, Michigan City, Ind.

Ball Bearings Standard on Pumps

Allis-Chalmers Mfg. Company, Milwaukee, Wis., Centrifugal Pump Division, announces the inclusion of ball bearings as standard equipment on nearly all its line of single-stage centrifugal pumps where peripheral speeds are not excessive and where the quality of the pumps are not jeopardized thereby. Since many purchasing engineers still prefer sleeve



bearings, these bearing housings are designed so that either type of bearing may be accommodated.

The design, selected in close cooperation with leading ball bearing manufacturers, is a single-row, deep-groove ball bearing on both ends of the pump in cast iron adapters arranged for grease lubrication. The designs call for conservative loadings based on carefully computed thrust and radial loads. The single-row type of anti-friction bearings have long

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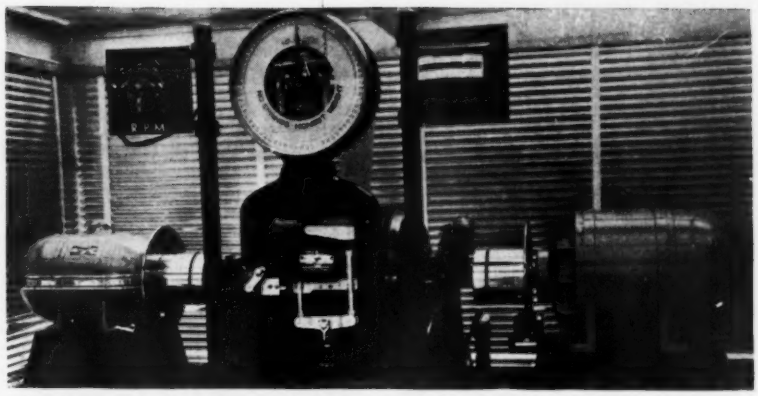
been successfully used in the company's motors, which have even much heavier loads than ever experienced in centrifugal pumps. However, where specific engineers call for double-row ball bearings, the Allis-Chalmers design permits that type to be used at but slight extra cost.

Lock nuts used on the shaft at both ends conveniently hold the ball bearings in place without resorting to any press or shrink fits. Their use makes the bearings entirely standard, requiring no special tools or special care in assembling or dismantling, and when needed makes the bearings easily obtainable in local warehouses.

The use of an adapter inside the main housing provides a sort of double seal which prevents grease from leaking to the exterior of the pump, and at the same time any water which may enter the bearing housing will be thrown off from the shaft before it can enter the adapter.

When the pump is dismantled, the adapters remain on the shaft as units to keep the bearings sealed and protected against damage.

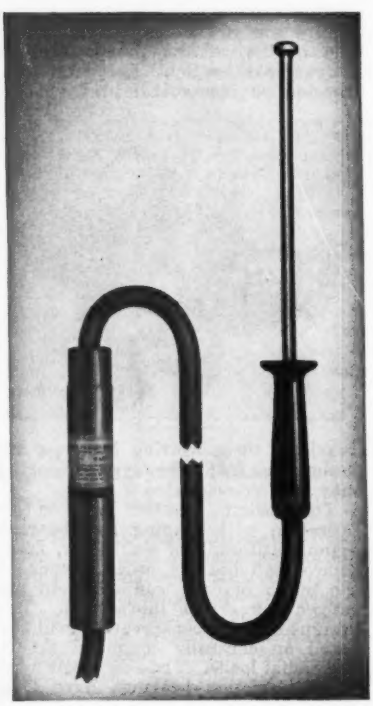


"The Electric Motor of Tomorrow" exhibit at the New York World's Fair. A completely Fiberglas-insulated motor in a standard (No. 254) 5-hp. frame size is shown at the left delivering, consistently, the same power as the standard (No. 324 frame size) cotton-wound 10-hp. motor at the right. The two motors are hooked up to a dynamometer through a coupling and the load may readily be alternated between one and the other. The gauges show that the small motor, which is some 160 lb. lighter in weight and 45 percent smaller in volume, will develop the same power as the larger standard motor and, at the same time, possesses the same or a superior amount of stamina

Double Cable End Fused Trolley Tap

Supplementing their line of fused trolley taps, the Ohio Brass Company, Mansfield, Ohio, announces development of a new type G fused trolley tap with double cable end. This provides a cable-clamping connection in each end of the tap, so that a protective fuse may be placed directly in a trailing cable. In addition to the double cable end tap, a special rubber handle suitable for holding contact ball or hook type nips has been designed. The combination of these two items offers more handling freedom and eliminates the necessity of holding the fused trolley tap in the hand while nipping along the trolley wire.

When used with the contact ball nip, the nip and rubber handle may be inserted in the forked jaw of a special Bulldog clamp, so that the locomotive may proceed into the room on cable reel.



General Electric Advances G. R. Prout and W. T. Darcy

G. R. Prout has been appointed manager of sales of industrial control, and W. T. Darcy has been appointed manager of sales of renewal parts, according to a recent announcement by W. C. Yates, manager of the control and renewal parts division of General Electric's industrial department.

Facepiece for Gas Masks

New wide vision, greater comfort, and added efficiency are advantages claimed for the new all-vision facepiece. It is U. S. Bureau of Mines approved, and announced by Mine Safety Appliances Company, of Pittsburgh, Pa., as standard for all their lines of gas masks.

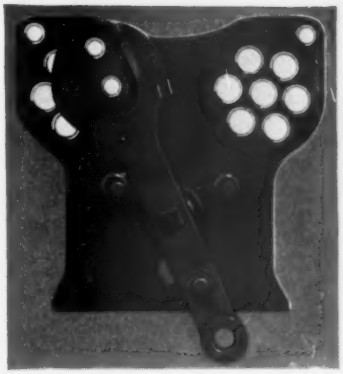
In designing the new facepiece, extensive research was conducted to determine the most favorable size and shape of lenses in relation to the size and shape of facepiece to accomplish these results: (a) Provide maximum usable lens area; (b) restrict dead air space to the minimum; (c) prevent fogging of lenses; and (d) keep weight as low as possible.

The size and shape of the lenses is such that the wearer's entire normal vision is unrestricted without having extra glass surface to pick up reflections or add unnecessary weight. The dead air space has been reduced, thereby cutting down rebreathing of exhaled air, which reduces fatigue and decreases the tendency to fog the lenses. The incoming air stream is

directed over the entire area of the lens by means of a new type of deflector built integral with the facepiece, thereby preventing fogging. In providing an absolutely gas-tight fit for wearers having large or small, thin or full faces, a large number of development trials were conducted. The resultant design is said to provide a perfect gas-tight fit on all types and sizes of faces.

Switch Signal Device

The Portable Lamp & Equipment Co., 77 First Avenue, Pittsburgh, Pa., has recently introduced a new switch signal device to the mining industry, which is designed to increase safety in underground haulage operations.



Employing red, green, and white reflector buttons instead of electric lights, the signal can be seen by an approaching motorman 1,000 ft. away, allowing him ample time to adjust himself for any condition of the switch. An electric cap lamp will pick up the signal 600 ft. away.

Outstanding features of this new Portable product are economy and simplicity of installation and operation. The device is mounted on a tie, opposite the switch throw, in such a position that the connecting rod will extend from the signal to the hole in the switch bridle bar. When the switch is thrown, the bridle bar automatically moves paddle arm and changes signal. All electric wiring, light bulbs, broken lenses, and expensive replacements are completely eliminated. Sturdily made of malleable iron, the signal will stand up under years of usage.

The manufacturers will be pleased to forward illustrated literature upon request.

Allis-Chalmers El Paso Office

With the recent retirement of Mr. J. B. Cooper, manager of Allis-Chalmers Mfg. Company's district office at Phoenix, Ariz., the company's former Phoenix office and its El Paso, Tex., branch office are now combined into one district known as the El Paso District. Mr. O. F. Metz, former branch manager of El Paso only, has been made district manager of the combined new territory, with offices at El Paso. Mr. H. H. Roth, of Phoenix, has been transferred to El Paso. Mr. Henry W. Erickson, recently transferred engineer from Allis-Chalmers Crushing, Cement and Mining Division at Milwaukee, Wis., will remain in the combined El Paso territory as a representative specializing in mining machinery built by the company.

Robins Conveying Closes S. America Contract

Mr. H. Von Thaden, vice president of the Robins Conveying Belt Company, has recently returned from an extensive visit in Chile, South America.

During this visit a contract was closed with the Compania Carbonifera y de Fundicion Schwager at Coronel, Chile, for a system of belt conveyors, both underground and surface. The conveyors will handle an ultimate capacity of 300 long tons per hour of 14-in. maximum, dry run-of-mine coal from an undersea mine to a preparation plant.

The system consists of eight 36-in. wide belt conveyors, approximating a distance of 2.25 miles. Several of these belt conveyors are exceptionally long. Conveyors Nos. 1 and 2 from the rotary car tippler to the foot of the inclined underground drift are 4,300 ft. and 970 ft. long, respectively. A series of five belt conveyors then conveys the coal to the mouth of the mine, a distance of about one mile. The surface conveyor from the mine mouth to the preparation plant is approximately 1,550 ft. long.

Westmoreland Mining Co. Contract to R. & S.

Roberts and Schaefer Company have been awarded a contract for complete sump air-flow coal-cleaning plant to be built for Westmoreland Mining Company in connection with their Hillside, Pa., operations.

The plant will have a capacity of cleaning 75 tons of ¾-in. x 0-in. coal per hour, and will be completed on January 15, 1940.

Kellogg Succeeds Yerkes as Link-Belt Treasurer

At a recent meeting of the board of directors of Link-Belt Company, Richard W. Yerkes tendered his resignation as secretary-treasurer. His smiling comment was, "After half a century's work for the company, I feel that I have earned the privilege of a long vacation and passing my duties on to younger shoulders."

Starting with the company at Philadelphia in 1890 as stenographer and file clerk, Mr. Yerkes advanced through the administrative departments, having for a long time been sales manager at Philadelphia. While

Harry E. Kellogg

Richard W. Yerkes

now retiring from the position of secretary-treasurer, which he has held since 1923, he will continue to serve as a member of the board of directors.

Mr. Harry E. Kellogg, who has been closely associated with Mr. Yerkes for the last 18 years, has been elected to succeed him as treasurer. Successively, Mr. Kellogg has held the positions of plant accountant, general credit manager, and chief accountant. In the capacity of chief accountant—the position that he has held for the last three years—he has exercised general supervision over all matters of taxation and accounting for parent and subsidiary companies.

Mr. F. V. MacArthur, formerly assistant secretary, was elected secretary.

Mr. Melbourne P. Anderson, formerly general credit manager, has been appointed chief accountant to succeed Mr. Kellogg.

Mr. C. W. Marum, for 28 years a member of the company's New York office, has been named general credit manager to succeed Mr. Anderson.

The John A. Roebling's Sons Company, of Trenton, N. J., manufacturers of wire and wire rope, insulated wire and cables and wire cloth and netting, announces the removal of its New York City offices on November 1, 1939, from 107 Liberty Street to the twentieth floor of 19 Rector Street.

CATALOGS AND BULLETINS

• DIESEL ENGINES. *Worthington Pump & Machinery Corp.*, Harrison, N. J. Bulletin S-500-B5E presents important features of company's vertical four-cycle, direct-injection diesel engine. 8 pages.

• DIESEL TRACTOR. *Caterpillar Tractor Co.*, Peoria, Ill. Form 5330 presents the outstanding mechanical features of the 61-hp. Caterpillar diesel D-7 tractor. Particular emphasis is placed on the 4-cylinder engine that powers the machine. 32 pages.

• DRILLS. *Worthington Pump & Machinery Corp.*, Harrison, N. J. Bulletin H-1200-B25 presents complete line of heavy-duty drifters. 6 pages.

• GRINDING EQUIPMENT. *Stephens-Adamson Mfg. Co.*, Aurora, Ill. Catalog 639 contains dimensions, capacities and installation data on company's new Mosley mill for pulverizing dry materials. 12 pages.

• MANGANESE STEEL. *American Manganese Steel Division of American Brake Shoe and Foundry Co.*, Chicago Heights, Ill. Catalog No. 59 is a very complete presentation of properties and application of manganese steel in its manifold uses. 64 pages.

• MOTORS. *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis. Bulletin B-6010 is a price list of company's squirrel cage and direct-current motors. 8 pages.

• MOTORS AND GENERATORS. *General Electric Co.*, Schenectady, N. Y. Bulletin 137D on low-speed synchronous motors, Type TS. 4 pages.

Bulletin 1960-A on company's low-speed synchronous generators—Types ATB and ATI. 4 pages.

• PUMPS. *Denver Equipment Co.*, Denver, Colo. Bulletin 39P8B1 on advantages of 5" and 6" Denver diaphragm pump with adjustable stroke. 4 pages.

Pomona Pump Co., Pomona, Calif. Bulletin 30 on company's new Little Chief all service pump. 8 pages.

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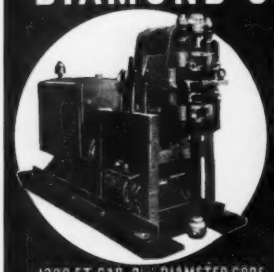

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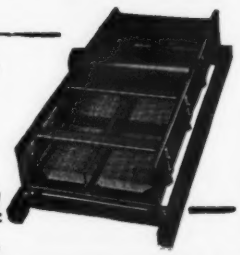

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